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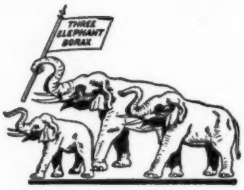

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R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXVIII NO. 8

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Harking Back to—

Bovine Bazaars

Jeff McDermid

THOSE big stock shows were always held in the dog days, and believe me, my old dogs knew it every night! For my well-earned certificate of tribute, if it ever comes, there should be handed to Saint Peter the following: "To Whom It May Concern, the bearer of this gate pass is freely entitled to enter herewith and spend most of his moments recording the merits of the sacred bulls and contented cows in the temple courts of Ceres and inscribing the decisions of the judge with all the hallowed respect that his halo justifies. No permit shall be required for the bearer to lug along a kodak, but a guardian angel shall be detailed to accompany him as protection against saintly stockmen who may harpoon him with their harps for alleged distorted photos of their grand champions."

If, however, Heaven is not designed as a spot wherein one may rest and refresh himself with something more safe and satisfying than hot wieners and burnt apple pie from the North Avenue Baptist ladies' aid, then a confirmed livestock show reporter should ask for a ticket to some more exciting place, even though it also features hoofs and horns.

I guess maybe I am the only one left of a once courtly crew of enthusiastic followers of the cattle circuit who nursed bursting ambitions as well as bunions in those gaudy days of news gathering in decorated coliseums. I became imbued, or infected, as you wish, by reading the charming columns of certain scribes who preceded me, like Martin, Wing, and Guard of the old Breeders' Gazette, and inspired to

film the purple bovines by scanning portfolios of pictures by Hildebrand and Strohmeyer.

Times have changed and I for one am glad they have. It strikes me we got into a sort of fashionable rut in doing our daily dozen in the wake of the dusty caravans. The worst mistake we made and lived to regret was putting so much youthful zest and wasted hours into the gathering and transcribing of solid columns of triple-decker animal names, slapping them down on paper up to the seventh place in each of two dozen classes to a breed.

I CAN see those tiresome rows of six-point yet, up and down the pages, continued drearily over to the next, and meandering boresomely onward past the ads for tractors, bag balm, and worm capsules. Probably it was good for the advertisers though, as readers quickly left the blurry mess of this cow census to revel in the display type and snappy sketches on the borders.

After a glaring day amid the ding-dong of the midway and the dung of the arena, with wilted collars, frayed tempers, and shaking shins, many of us hied to some hotel uptown for a short snort and a hurried dinner. This was just a little eye-opener, though, as the real job of the assignment beckoned us from the hall bedroom on the fifth floor back, looking out upon the grease-spotted pavement of a noisy parking lot.

After a short soak or a spattery shower in the rusty tub, we sat down in BVD abandon to peck out the dubious collection of soon-forgotten bovine names from the hastily marked margins of our hefty stock show catalogs.

Here one had to guard oneself zealously against the combined effect of the beer and the bath, so as not to give the junior champion heifer the royal purple, or list the wrong owner as winner of the most blues. If you ever stooped to mangle a typewriter at a low table or even a bedspread, using the other hand to keep a bulky catalog flat at the proper page, you'll get a bit of insight into the physical foolishness of it.

Sometimes you got the jitters when a blank unmarked page met your eye, indicating that you had been busy telling a cute story just when they led away the senior yearling bulls or ribboned the produce-of-dam class. It meant reaping the penalty of sloth, causing you to ring up another scribe in an equally close room to see if you could trade him a get-of-sire for a missing digit in your encyclopedia of nomenclature. It usually made him sore to be disturbed when he had almost finished the Holsteins without misspelling Pietertje Heilo Djerke, but he knew there was another day coming and you had to be pals or quit.

Well, anyhow, to make a long story as short as it should have been but wasn't, you peered and pecked and sweated in that cubicle until the rooster began to get uneasy on the outskirts of town. You were expected to have a neat set of typed pages ready to fling into the mail box en route to another day's tan-bark pleasures—but a bed and breakfast had to be wedged in somehow, meanwhile notwithstanding. And you had a solid, continuous six weeks of pumpkin shows to cover, without using a radiator on your typewriter.

SO much for the ordinary routine when nothing unforseen happened. But once upon a miserable time at the great Chicago International two of us working for the same rural rag were cooped up in the Atlantic hotel pushing copy in the same room. We always had brilliant "leads" to use as overtures to each breed story, in which we told the same stuff over and over about the "bloom" and "scale" and "finish" marking each entry which won judicial favor, or tieing into some judge who was snooty to the press.

After two nights of trying to outdo each other in adjectives and hyperbole, plus six-point name details, I handed the finished masterpieces to another staff man who offered to carry the

precious cargo to the linotypes. Next day at noon a long distance call from him informed me that he lost his baggage on a continental express, so would we please repeat and rush it in? I draw the curtain here because we had made no carbon copies. Even in this tolerant day of free speech and nasty novels, the publishers refuse to let me tell you what we said.

That infuriated me about as much as the time this same guy came to the Minnesota state fair to "help me." He came in the front gate with a flower at his buttonhole, smiled at the clerk's stenographer, glanced at the grounds fleetingly, darted back to town in a taxi, dictated a few pages to a hotel typer, and spent the remaining blissful hours in a handy bar. He hit the front page but I furnished the reams of trailing copy that nobody read, except the chaps who accused me of putting their third-class calf into fifth-place position—and my only excuse was lack of aspirin.

"Rewards" and "awards" sound alike but they don't mean the same thing to a veteran livestock reporter. The first is something a good reporter never gets enough of from his boss or the dear public, and the second is something some guys get without earning it, especially rich gentleman farmers showing imported cows.

There never has been enough money in the livestock paper business to properly pay off the scribes who did the dirty work back when fair managers furnished no easy facilities for getting the official prize lists.

Bear in mind in those demented days before publicity departments were set up at fairs that we pencil-pushers had to cover cattle rings, sheep rings, swine rings, and goat rings, and we almost had nose-rings ourselves before the week's "bull" was put to press.

They always put the barns and arenas so far apart that a man got worn to a frazzle tramping back and forth trying to keep wise to all the goings on. The cattle show on the third day was enough to make a man wish he had a neck adjustment like a ventriloquist's dummy, free to whirl in all directions. To the north they led in the dairy breeds, to the south the beef cattle, to the east the draft horses were pawing, and over in the last crowded corner were the wobbly 4-H calves. Then half a mile across the sunlit field was the hog barn where the big pork-chasers were hurdling their snorters; to the sheep arena you had to trudge another marathon; and who would protect you in the cow circus if you left?

By getting well organized between us without playing too far toward the rival sheets, we scribblers were able to keep fairly well up with the awards books without running our socks clear off. But we used to use a knife and cut thumb-nail notches in our catalogs so we could locate the pages fast and be sure not to get the champ Hereford prize nicked onto some Jersey bull. It was a far cheaper way to get dizzy and punch-drunk than prying loose some change in a souse shop.

NATURALLY all mistakes were chalked up to the paper that printed them, even though they were often collective errors of the whole gang exchanged in the hurly-burly business of marking down awards without official reports. I am sure that some of those misprints actually meted out better bovine justice than the

(*Turn to page* 51)

A Trash Mulch Method[1] Of Reclaiming Land With Alfalfa

By H. L. Borst and R. E. Yoder[2]

TO the many Ohio farmers who are convinced that alfalfa will not grow on their unproductive, eroded hilly fields, the Soil Conservation Experiment Station and the Ohio Agricultural Experiment Station accomplishment of raising good alfalfa crops on such land is more than eye-opening news. For many a discouraged owner of hilly farm land it is the first step on the way to profitable farming, especially at a time when alfalfa and the livestock it will feed are in such demand.

It is common belief that alfalfa will succeed only on soils at fairly high levels of ferility. Prospective growers have been advised to build up their soils for a rotation or so before attempting alfalfa. They have been advised to put a little alfalfa seed in their meadow mixtures to "prepare" their soil for alfalfa. Consequently, using alfalfa seeded directly as one step in reclaiming impoverished soils may seem revolutionary to many; in a way it is, but constructively so.

Basic requirements for alfalfa are: favorable climate, well-drained soil, nearly neutral soil reaction, an ample supply of mineral elements. Experiments in Ohio and elsewhere show that alfalfa will grow where these conditions are met. Climate is generally favorable for alfalfa anywhere in Ohio. Muskingum and related hill soils are well drained, usually overdrained rather than underdrained. Consequently, when lime and the mineral fertilizers are added in sufficient quantities, these soils make a favorable location for alfalfa.

Another important key to success with alfalfa under these conditions is to protect the land from the destructive forces of rainfall and erosion by leaving the soil covered with a blanket of organic material. Existing vegetation, which usually consists of broomsedge, poverty grass, and weeds, is converted into a surface trash mulch which promotes infiltration, decreases and controls runoff, eliminates erosion, and conserves moisture by decreasing surface evaporation. This protection cannot be provided by plowing, but it can easily be by disking the soil in the proper way while preparing the seedbed for the new seeding. Seeding the meadow directly, without the conventional small grain, eliminates competition by the so-called nurse crop.

Effectiveness of the "trash mulch" method of direct seeding of meadows in controlling soil and water losses resulting from erosion is shown in Table 1.

For six years, alfalfa-grass meadows have been established successfully without plowing on eroded, unproductive broomsedge (*Andropogon virginicus* L.) and poverty grass (*Danthonia spicata* L. Beauv.) hills at the Soil Conservation Experiment Station, Zanes-

[1] A joint contribution of the Research Division of the Soil Conservation Service and the Ohio Agricultural Experiment Station.

[2] Project Supervisor, Soil Conservation Experiment Station, Zanesville, Ohio; Chief in Agronomy, Ohio Agricultural Experiment Station, Wooster, Ohio, respectively.

TABLE 1.—EROSIONAL LOSSES FOR TWO WATERSHEDS SEEDED BY TWO DIFFERENT METHODS*

Seeding method	Size of watershed in acres	Slope of watershed in per cent	Soil and water losses†	
			Runoff in inches	Soil losses in tons per acre
Conventional—in wheat	1.69	12.7	12.18	21.3
Direct seeding—trash mulch	1.63	21.7	2.64	.1

* Results from North Appalachian Experimental Watersheds, Coshocton, Ohio. Courtesy of Soil Conservation Service.

† Annual soil and water losses for 1940, the year in which the seedings were made.

ville, Ohio. Meadows thus established have produced an average of 2.5 tons of alfalfa-grass hay per acre the year after seeding. The yields obtained are almost one ton greater than those from the average hayfield in Ohio.

Experiments aimed at establishing desirable vegetation on eroded run-down land have been carried on at the Soil Conservation Experiment Station since its establishment. Early studies supported the common belief that establishing a cover on eroded or run-down land in an effort to return it to a productive state is a slow process.

A trial seeding of alfalfa was made on a badly eroded field in the spring of 1936. About one-half the area used was bare; the rest was covered by a sparse growth of poverty grass and some briars. The area, an eroded Muskingum silt loam, had lost most of its topsoil. The soil reaction was very acid, approximately pH 5.4.

To this field, coarsely ground limestone (20 per cent through 100-mesh) was applied at a rate of 4 tons per acre. The land was disked. Twenty per cent superphosphate was put on at 400 pounds per acre. Inoculated, hardy alfalfa was sown at about 15 pounds per acre. When this was done, strips of timothy, smooth brome grass, and orchard grass were sown across the area, which was then cultipacked on the contour.

The resulting seedings were so promising that similar plantings have been made each subsequent year except 1939.

The area used in 1937 was similar to that treated in 1936. There were some bare spots, but most of the field had a fair growth of poverty grass. The land had previously received some lime,

TABLE 2.—HAY YIELDS OBTAINED FROM ALFALFA-GRASS MEADOWS SEEDED DIRECTLY ON ERODED LAND WITHOUT PLOWING

Meadow mixture seeded	Year sown	Hay yields in tons per acre			
		1939	1940	1941*	1942
Alfalfa, timothy, and orchard grass	1937	2.60	2.77	1.75	2.08
Alfalfa and timothy	1938	3.00	3.25	2.25	3.90
Alfalfa and brome grass	1940	.....	.....	1.90	3.35
Alfalfa and orchard grass	1940	.....	.....	1.75	3.00
Alfalfa and orchard grass	1941	.....	.....	.....	1.60†

* Yields low because of low rainfall.

† One cutting only.

and a small portion of it had been seeded to orchard grass in 1933. Most of the area had been in pasture for more than 20 years. The 1938 area had been cropped last in 1931 and had received some lime previous to that date; at the time of the test it was covered with weeds, except for an occasional patch of thin bluegrass. The five areas used in 1940, 1941, and 1942 had been abandoned for more than 10 years, and none of them had ever been limed; their vegetation was similar to that of the other areas except that more broomsedge was present.

This picture shows area 40-B as it appeared in April, 1940.

Three cuttings of hay have been made on all areas each year following the year of establishment. First cuttings each year have been mixed hay; second and third cuttings have been nearly straight alfalfa. The hay yields have equaled or exceeded those of the rotation meadows on the Soil Conservation Experiment Station except in 1941, when they were low because of scarce and poorly distributed rainfall.

In addition to the trials at Zanesville, seedings were made at the North Appalachian Experimental Watershed Project, Coshocton, Ohio, in 1940, and at the Ohio Agricultural Experiment Station, Wooster, Ohio, in 1942. Both these were successful. In 1940, several farmers near Zanesville made trial seedings of the sort discussed. Wherever made with proper care, such direct seedings have been successful.

How To Do It

As a result of the experiments described, the following procedure is recommended for the direct establishment of alfalfa meadows on eroded hill lands:

Apply lime, always enough to neutralize the acidity of the soil or very nearly so, any time before sowing the alfalfa; the earlier the better. Have the soil tested and take no chances. On most Muskingum soils, at least three tons per acre of "agricultural ground limestone" will be needed. If a coarser grade is used, four tons or more per acre may be advisable. Be sure to use enough lime.

Disk in late March or early April as soon as the soil can be worked. Preliminary disking can be done the preceding fall. The soil should be moist, not dry, when disked. It is better to disk the soil a little on the wet side rather than wait

too long. The field should be well disked but not worked up into a fine or dusty condition. The old vegetation, which forms the important protection against the forces of erosion, should be left on or near the surface. It is usually necessary to put considerable weight (200 to 400 pounds) on the disk, particularly if the old vegetation is heavy. If the old vegetation is an extremely heavy growth of broomsedge, it may be desirable to remove enough of it so that the disk can cut through. A tractor disk does a better job than a horse-drawn implement. In fact, heavy sods cannot be cut up without tractor power. Where the old vegetation is thin, double disking (lapped one-half) twice will be sufficient. Do not try to prepare a deep seedbed. In fact, avoid doing so. Areas with a dense growth may require three and even more double diskings. As a somewhat cloddy seedbed is desired, it is not necessary to harrow except possibly with a spring-tooth, which keeps the trash mulch and clods on top of the seedbed. The final tillage operation, cultipacking, should be done on the contour.

Area 40-B in October of the same year with the cover established by trash mulch seeding.

Fertilize with 0-14-7 or 0-12-12 at a rate of 350 to 400 pounds per acre. Alfalfa requires an abundance of phosphate and potash, as well as lime. Neglecting to supply fertilizer may result in seeding failures.

The fertilizer used in most of the early trials was 4-10-6. Since the opinion was current that alfafa will thrive only on soils of good fertility, a complete fertilizer with a fair nitrogen content was applied. However, seedings made with phosphate-potash fertilizers in 1941 and 1942 appear as thrifty as those made with fertilizer containing nitrogen; so the use of nitrogen-carrying fertilizer is not recommended. The fertilizer should be drilled into the soil with a grain drill either before, or at the time, the seed is sown.

Seed with a mixture of alfalfa and grass. The following seeding mixtures (pounds per acre) are suggested:

Alfalfa 10; timothy 6
Alfalfa 10; orchard grass 5
Alfalfa 10; alsike 2; timothy 6
Alfalfa 10; ladino clover 1; timothy 6

Timothy, orchard grass, and smooth brome grass have been used along with

(*Turn to page* 49)

Fertilizer Expenditures In Relation to Farm Income

By A. L. Mehring

Chemist, Bureau of Plant Industry, U. S. Department of Agriculture, Beltsville, Maryland

THE relationship between total expenditures for fertilizers and national farm income has been investigated by Vial (9)*, Willett (10), Kriesel (5), Brodell and Cooper (1), and Mehring and Shaw (6).

Vial showed that the fertilizer consumption in a given year could be estimated with a fair degree of accuracy from the previous year's acre value of four principal crops and the two previous years' fertilizer consumption. In the other studies, a close relationship was found between expenditures for fertilizer and either gross or cash farm income. Mehring and Shaw found that farmers spent on the average 2.68 cents of each dollar of the previous year's total cash income for fertilizers and that the total cash income of the previous year was somewhat more closely related to the expenditures than either the gross income or the total cash value of crops.

In all previous studies on the subject it appeared that the farm income from the previous year and also from the present year were closely related to expenditures for fertilizers. Willet ascribed the relationship to the present year's income. Brodell and Cooper, and Mehring and Shaw apparently considered the previous year's income more important. Kriesel appears to believe that in some years one is more important and that in others the relationship is reversed. It is practically impossible from the data previously available to determine whether the size of the farm income in the past year and in the present year both influence the amount of money spent by farmers for fertilizer. If both are factors, what is the relative importance of each? It seems desirable to determine this relationship in order to be able to forecast the demand for fertilizer more accurately than has been possible in the past.

The total cash income of farmers as reported by the Bureau of Agricultural Economics (8) is given separately for the years starting with 1910 for 3 classes of income; namely, income from marketings of crops, income from marketings of livestock, and government payments.

The total farm income includes a much larger proportion of income from marketings of livestock products than from crops in some years and in others the reverse is true, but large parts of the eggs, butter, milk, and meat come from farms that use little or no fertilizer. On the other hand, most of the fertilizer is used in the sections where income from livestock products is relatively much less important. For example, in 1942 cash income from animal products and total farm income in Iowa were $1,019,585,000 and $1,289,993,000 and in North Carolina were $64,918,000 and $449,803,000. Thus, the income from animal prod-

* Numbers in parentheses refer to Literature Cited.

ucts in these two states was 79 and 14 per cent of the total, respectively.

Naturally, farmers buy as much fertilizer as they think they can afford because under certain conditions they know that it pays well to use it, so the income from the previous year should be important in deciding how much will be spent. But demand should also be influenced by prospects of a good market. If the farmer has doubts at the time of planting about being able to get a satisfactory price for his crop, he won't use as much fertilizer as when he is practically certain of a high price for whatever he can produce. Government payments should also be a factor, because the farmer knows at the time he plants his crop approximately what the payments will be. Expenditures for fertilizers were studied by statistical meth-

TABLE 1.—THE FIGURES USED IN CALCULATING THE COEFFICIENTS OF CORRELATION BETWEEN EXPENDITURES FOR FERTILIZERS AND FARM INCOME

Year	X_1 Expenditures for fertilizers (3)*	X_2 Cash income from crops and government payments in previous year (4)	X_3 Cash income from crops and government payments in the same year	X_4 Proportion of previous year's total cash income remaining after cost of production is deducted **
	million dollars	*million dollars*	*million dollars*	*Per cent*
1911	175	2950	2925	38
1912	164	2925	3111	35
1913	179	3111	3095	35
1914	201	3095	2920	35
1915	174	2920	3280	32
1916	186	3280	4043	34
1917	205	4043	5660	37
1918	309	5660	6985	43
1919	442	6985	7674	44
1920	416	7674	6654	42
1921	256	6654	4199	28
1922	225	4199	4321	16
1923	253	4321	4885	26
1924	255	4885	5415	25
1925	281	5415	5526	26
1926	268	5526	4889	32
1927	238	4889	5157	29
1928	295	5157	5044	30
1929	277	5044	5125	29
1930	276	5125	3840	31
1931	189	3840	2536	22
1932	111	2536	1997	12
1933	116	1997	2604	20
1934	157	2604	3450	30
1935	177	3450	3551	33
1936	206	3551	3938	35
1937	253	3938	4315	35
1938	226	4315	3672	33
1939	233	3672	4173	29
1940	237	4173	4236	29
1941	266	4236	5303	29
1942	328	5303	7084	36
1943	413	7084	8576	46

* See Literature Cited.

** Agricultural Statistics, 1942; Table 735 for data from which these figures were calculated for 1910 to 1939. Later data very kindly supplied by H. C. Norcross of the Bur. of Agr. Economics.

ods in relation to income from crops and other farm income in the same year, in the previous year, and on the average in both years.

The average expenditure for fertilizer per dollar of income was calculated from the income figures and the expenditures, as given in Table 1. Then the coefficient of variation was determined from the deviations of these figures from the mean for the 33 years. The coefficients obtained are given in Table 2. These coefficients show clearly that the quantity of money spent for fertilizer is highly dependent on amount of income from the past year and the present year. The relationship with the previous year's income is shown graphically in Figure 1. When expenditures from income from crops only were calculated it was apparent at once that government payments should not be left out. When they are omitted there are large deviations from the mean, all in the same direction in each of the years in which government payments were made. Income from government payments is related to expenditures for fertilizers in the same way as income from crops.

TABLE 2.—COEFFICIENTS OF VARIATION OF ANNUAL EXPENDITURES FOR FERTILIZERS FROM THE 33 YEAR MEAN, 1911-1943, PER DOLLAR OF FARM INCOME OF VARIOUS KINDS

Kind of Income	Expenditure per dollar of income		
	Previous year	Same year	Average of previous and same year
From crops only.	14.3	.....	.....
From crops plus gov't payments..	10.4	14.6	9.1
Total cash income	11.9	13.5	10.2

Expenditures for fertilizers are closely associated with total cash income during the previous year, as well as that in the same year (correla-

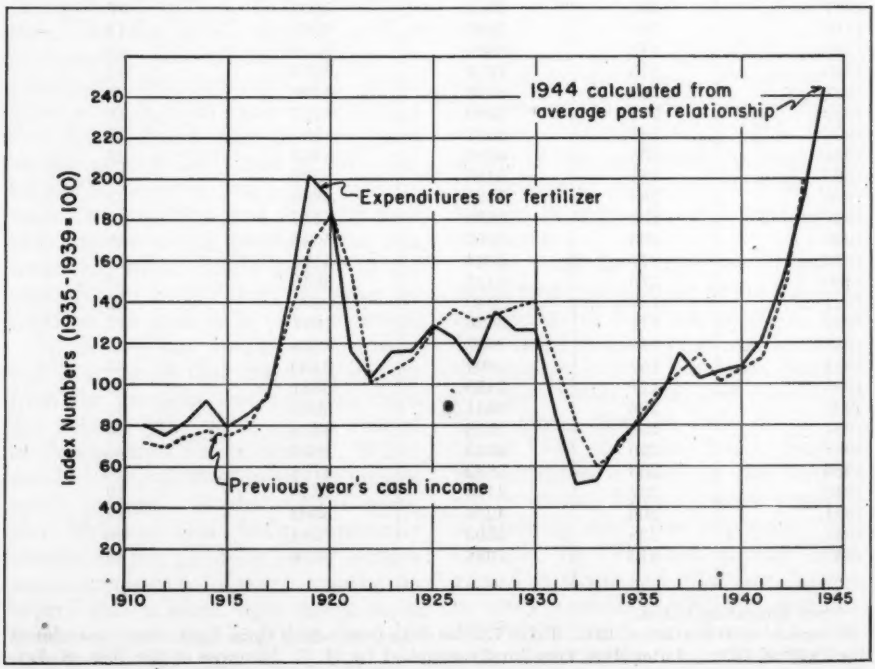

Fig. 1. Expenditures for fertilizer and previous year's cash farm income.

tion coefficients +.9209 and +.8855, respectively). But income from crops plus government payments in both years is a little more closely correlated with fertilizer purchases (+.9291 and +.9009) than is the total income. The differences, although no greater than the standard errors and therefore not significant statistically, confirm the indications of the variation coefficients that the sum of the income from crops and government payments is slightly more closely associated with expenditures for fertilizer than total income is. The income from crops plus government payments will be used, therefore, in the remainder of this study. The statistical values with the two measures of income are so nearly alike, however, that it seems that total cash income would do almost as well for estimating fertilizer demand. It also appears from the values of the correlation coefficients that either the previous or the present year's income is of about equal value for this purpose. But this latter statement is not true. It only seems to be so, because the income itself in one year is highly correlated with income in the year next to it, as will be shown more fully later. It will also be shown later that the income in the previous year is of greater value for estimating purposes than that of the present year. For best results it is necessary to consider both as factors affecting fertilizer expenditures.

It seems reasonable that the amount of money spent by farmers for fertilizers should be influenced by the quantity of money remaining after expenses of production in the preceding season had been deducted. A coefficient of variation of 104.7, however, shows that the total amount of money left over after expenses are paid is not closely related to fertilizer purchases. On the other hand, the coefficient of variation in the relationship between the proportion of the total income left over and expenditures for fertilizer is 28.5. The size of this coefficient indicates that the proportion of the previous year's income left over after all expenses of production are deducted may be another factor in determining the amount of money to be spent for fertilizer. Thus we have three factors that all appear to be affecting expenditures for fertilizers simultaneously. Other factors, such as credit, may be involved but this possibility was not investigated further.

In order to evaluate the effects of the three factors now appearing to be important in the problem, it will be necessary to calculate both multiple and partial correlation coefficients.

Correlation coefficients were calculated to show the simple degree of relationship between each set of figures in Table 2, taking every possible combination of two. The results are as follows:

	Correlation coefficients	*Standard errors*
r_{12}*	+.9291	.0238
r_{13}	+.9009	.0328
r_{14}	+.5701	.1175
r_{23}	+.8254	.0555
r_{24}	+.4353	.1411
r_{34}	+.5677	.1180

* r_{12} is the correlation coefficient between the X_1 and X_2 data in Table 1. r_{13} is that between the X_1 and X_3 figures and so on.

All of these coefficients are significant. The first one shows a very high degree of relationship between expenditures for fertilizers and income in the previous year. But the next coefficient also indicates a high degree of relationship with income in the same year. This is only possible if the income in one year is related to that in the next year. The coefficient r_{23} shows that they are related. High income in one year is usually followed by high income in the next and vice versa. Considerable relationship appears to exist between the proportion of money left after expenses of production are cared for, and money spent for fertilizer in the next year ($r_{14} = +.5701$). The amount of money left over is also related to the size of the income as one would naturally expect ($r_{24} = +.4353$ and $r_{34} = +.5677$). Correlation between factors that are mutually correlated to other factors gives results

TABLE 3.—EXPENDITURES FOR FERTILIZERS (X_1), FARM INCOME FROM CROPS AND GOVERNMENT PAYMENTS IN THE PREVIOUS YEAR (X_2), AND FARM INCOME IN THE SAME YEAR (X_3), BY STATES (1,000 DOLLARS)

	Massachusetts		Pennsylvania		South Carolina		Ohio		Texas		Indiana		Minnesota	
	X_1	X_2 & X_3	X_1	X_2 & X_3	X_1	X_2 & X_3	X_1	X_2 & X_3	X_1	X_2 & X_3	X_1	X_2 & X_3	X_1	X_2 & X_3
1924		35,770		104,139		123,513		130,407		684,773		108,110		
1925	2,286	36,821	9,099	110,466	26,372	131,671	11,465	125,091	4,435	570,786	8,254	108,689		
1926	2,055	35,094	9,372	116,772	26,666	98,452	10,346	132,324	3,726	493,859	8,465	117,312		
1927	2,382	34,516	10,431	100,247	18,772	120,317	10,067	126,043	2,675	584,699	8,998	98,372		103,361
1928	2,478	34,085	9,894	91,683	24,011	104,633	10,999	96,200	5,172	611,002	8,255	71,583	675	94,579
1929	2,075	34,643	9,664	93,301	22,612	115,293	10,906	98,719	7,076	516,175	9,242	81,645	581	97,794
1930	2,152	31,937	9,815	84,269	20,709	82,391	10,346	80,934	5,085	325,559	9,543	69,530	751	81,441
1931	1,863	26,339	7,491	62,628	15,097	50,894	6,898	73,732	2,281	226,767	6,073	48,339	792	47,359
1932	1,518	19,837	5,541	50,627	9,331	38,643	4,008	54,855	1,009	212,198	2,938	36,824	385	31,378
1933	1,249	23,471	5,099	56,370	10,793	58,182	4,567	72,284	857	290,639	3,010	43,833	251	53,395
1934	1,556	23,408	6,308	62,650	13,048	92,332	6,898	92,387	1,504	338,293	4,327	70,647	353	64,778
1935	1,710	25,909	7,119	68,995	13,725	92,771	8,016	103,362	1,968	327,071	5,692	77,347	390	81,367
1936	1,844	30,016	7,745	88,370	13,713	93,789	9,414	120,504	1,982	316,947	7,455	82,554	356	87,892
1937	2,190	30,278	9,621	87,965	17,938	97,402	10,346	113,547	2,884	394,199	7,537	86,239	482	113,398
1938	1,998	26,801	9,565	71,795	14,601	83,967	9,135	91,812	2,725	305,895	7,000	67,989	517	85,949
1939	1,863	31,655	9,465	82,504	15,145	99,771	9,787	115,494	3,127	340,962	6,420	87,702	502	118,379
1940	1,883	29,948	10,076	82,454	18,750	99,856	10,160	108,593	3,979	349,601	7,107	91,695	751	143,730
1941	2,017	37,188	10,896	90,795	19,206	87,602	11,558	135,148	4,304	449,014	8,562	112,015	830	131,508
1942	2,401	41,078	11,595	107,999	20,311	140,795	14,168	195,840	4,786	529,247	10,597	151,205	938	163,564
1943	2,824	54,872	12,806	131,181	26,581	166,040	16,779	201,307	5,402	639,237	11,059	173,688	1,375	195,094
r_{12}	.9211		.7708		.9004		.8989		.7913		.8602		.8707	
r_{13}	.8660		.8235		.7307		.8775		.6916		.7870		.7576	
r_{23}	.7990		.8094		.6671		.8209		.7949		.8512		.8606	
$r_{12.3}$	.7624		.3131		.8123		.6533		.5514		.5880		.6575	
$r_{13.2}$	.5559		.5338		.4015		.5581		.1687		.2047		.0331	
	*cents 6.5		cents 10.6		cents 19.2		cents 9.0		cents 0.8		cents 8.7		cents 0.7	

*Average expenditure per dollar of income from crops and government payments in the previous year.

that are too high or too low, and the correlation coefficients may be entirely misleading. Tangled relationships may be untangled by means of partial correlations.

When the effects of the other two variables are accounted for by partial correlation, as shown by the value of the second-order coefficient ($r_{12.34} = +.781$*), the correlation between expenditures for fertilizer and income in the previous year is shown to be much less than indicated by the zero-order coefficient +.9291. The income in the present year appears to have still less effect on expenditures ($r_{13.24} = +.554$) than the income from the previous year when the effects of other variables are removed from it also. But the reduction of r_{12} from .9291 to .781 is slight compared to that of r_{13} from .9009 to .554 when the effect of other variables is removed. This is a highly important result, because from either charting the data or simple correlation the present year's income appeared to be almost as important as the previous year's income in determining what the farmer would spend.

The multiple correlation coefficient $R_{1.234}$ shows the effect on X_1 of X_2, X_3, and X_4 all acting together. In this case it was found that $R_{1.234} = .968$. The square of a correlation coefficient multiplied by 100 gives the percentage of the total deviations from the mean of one set of data that are associated with corresponding deviations in another set as measured by the coefficient in question. Thus it appears that 93 per cent of the fluctuations ($R_{1.234} = .968$; $.968^2 \times 100 = 93$) in expenditures for fertilizer may be accounted for by the three factors used in this study. This total is broken down as follows: 55.8 per cent ($r_{12.34} = .781$) of the deviations from the average are accounted for by similar fluctuations in farm income in the previous year, 27.9 per cent ($r_{13.24} = .554$) by fluctuations in the same year's income, and 9.3 per cent ($r_{14.23} = .305$) by changes in the proportion of the previous year's income remaining after expenses of production are deducted.

At this point it is proper to ask, "Do similar associations exist between farm income and quantities of money spent for fertilizers in the various states?" The high correlation found for the United States might be a coincidence, though the chances that it is are extremely slim. If, however, the same sort of association is found to exist in individual states, the argument that it represents a real relationship would be more convincing.

Correlation coefficients were therefore worked out for a few states scattered throughout the fertilizer-consuming part of the country, using the data given in Table 3. The farm income from crops and government payments are taken from publications of the U. S. Bureau of Agricultural Economics (8). The expenditures for fertilizers in Indiana were taken directly from Kraybill, et al. (4). The others were calculated in various ways according to the kind of necessary data readily obtainable. For example, the Texas figures were computed from the tonnages sold of each grade and the average selling price of that grade as given in the annual bulletins of the Texas Fertilizer Control. See Fraps, Ogier, and Asbury (2). Minnesota figures were obtained from the tonnages by grades of fertilizers sold and the average cost per unit of plant food in each as given by Halvorson and his coworkers (3). The Pennsylvania figures were gotten by multiplying the tonnages of nitrogen, phosphoric acid, and potash, as given in the annual Fertilizer Reports of the Pennsylvania Department of Agriculture (7), by the annual retail values of each. The data for the other states were figured from retail price lists of fertilizer companies and the total tonnages of fertilizers sold annually in those states.

The correlation coefficients are given at the bottom of Table 3. Those for Massachusetts, South Carolina, and

* The second-order coefficients given in this paper were each calculated from two different sets of first-order coefficients and the results obtained checked in each case.

Ohio are of about the same order and give the same indications as those for the United States as a whole. The association between the present year's income and amount of money spent for fertilizer in Pennsylvania, however, is higher than that with the previous year's income. This may be due to errors in the basic data or may indicate that farmers in Pennsylvania are more influenced than those of some other states by prospects than they are by the money made in the previous season when it comes to buying fertilizer. In Texas and Minnesota, where relatively little fertilizer is used, the correlations are not as close as they are in the heavier consuming regions of the East.

The percentages of the deviations in expenditures for fertilizers associated with similar deviations in farm income from crops and government payments when the correlation between income in one year and that in the previous year has been removed are as follows:

State	*Income in the Previous Year*	*Income in the Same Year*
Massachusetts	58	31
Pennsylvania	10	28
South Carolina	66	16
Ohio	43	31
Texas	30	3
Indiana	35	4
Minnesota	43	1
United States	57	41

These figures seem to indicate that in all states the amount of money received in the previous season from the sale of crops and government payments combined is an important factor in determining how much farmers will spend for fertilizers. Of the states studied it appears to be strongest in South Carolina and least important in Pennsylvania. In the Eastern states the prospects of high or low income in the same year in which the fertilizer is bought would also seem to be a factor, as indicated later by the income actually received. This seems to be of little or no consequence in the Central states.

It should be noted that accounting for the deviations from the mean associated with similar deviations in the proportion of the previous year's income left after expenses had no effect in reducing the correlation between the previous year's income and expenditures but reduced that with present year's income still further. The necessary data were not available to calculate second-order partial coefficients for the several states on the basis in which they are given for the United States.

The following equation:

$X_1 = .03293X_2 + .01766X_3 + 1.159X_4 - 18.8435$ gives the line of closest fit to the data. By substituting the values of X_2, X_3 and X_4 in Table 1 in this equation and solving for X_1 the calculated expenditures charted in Figure 2 are obtained. By comparing Figures 1 and 2 it will be seen that one can estimate the expenditures for fertilizers a little more accurately by means of this equation than has been done previously by taking the average expenditure of the previous year's income only. The standard error of estimate with this equation is 20.5 million dollars, whereas it was at least 42 million dollars with any method previously available.

At first thought it might seem that this equation had little value in estimating the current year's expenditures for fertilizers because the value of X_3 can never be known accurately until after the year in question is over. But past performance shows conclusively that farmers have been estimating it on the average pretty well. In the past the cash income has been only a little higher or a little lower than it was in the preceding year in most cases. Only in 1917, 1918, 1919, 1921, and 1930 was the farm income much different than might have been predicted at the beginning of the year and a study of the facts leads to the conclusion that in these years the expenditures were about what would have been predicted by the use of the

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Coker 100, strain 5, in Mr. Wadsworth's tests conducted in 1943, yielded 2,800 lbs. seed cotton; lint, 37.9%; staple, 1 3/32 inches; lint cotton per acre, 1,061 lbs.

J. B. Wadsworth— Progressive Farmer

By B. E. Grant

County Agent, Windsor, North Carolina

J. B. WADSWORTH of Woodville, Bertie County, North Carolina, is demonstrating how a farmer by hard work and careful planning can build up the fertility of his soil and grow profitable crops. He has lived in the township where he now lives all his life, except for the time he was in World War No. 1. He has been farming for himself 25 years. For the first three years, he rented land from his father and then bought the farm adjoining the one where he now lives.

When he first began farming, a bale of cotton per acre was as high as he made although he did not have any boll-weevil at that time. Through the years he has realized that in order to harvest good crops from the soil it is necessary to build up and feed the soil, instead of trying to get as much as possible from the land without putting anything back. Through a combination of both summer and winter legumes, barnyard manure, leaf mold, and the liberal use of fertilizer he now has one of the most productive farms in this vicinity.

He tries to follow a three-year rotation of cotton, peanuts, corn and soybeans with a winter legume or small grain crop following the peanuts, to be turned under for corn. His farm is located in the center of the peanut section where Virginia type peanuts are

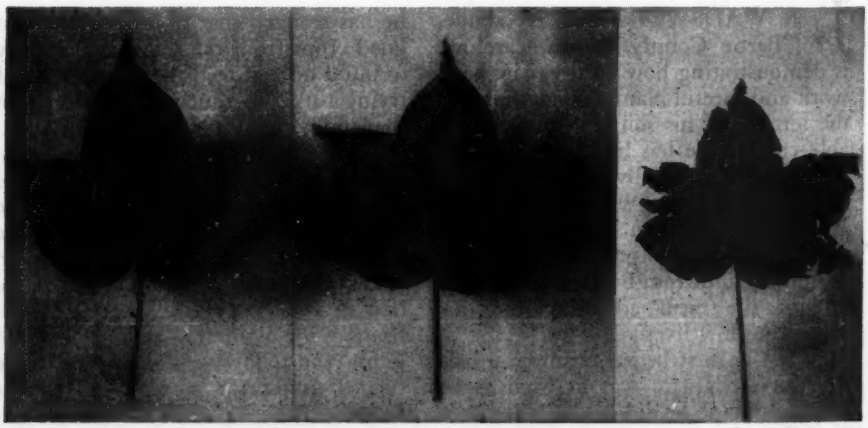
grown, and where many farmers follow a two-year rotation with peanuts on the land every other year. But he has found that, over a period of years, he will not only produce as many peanuts in following a three-year rotation, but will keep up the fertility of his land better and produce a larger crop of cotton and corn.

On one 17-acre field of poor land, which he bought in 1930, he only made 180 bags of peanuts the first year. Realizing something would have to be done before this field could produce the kind of crops he wanted, he spread the peanut vines on the land as far as they would go and covered the balance of the field with woods mold and leaves. He planted the field in cotton and produced a bale per acre. Next, the field was planted in corn and soybeans and produced 40 bushels of corn per acre. Peanuts followed and produced 400 bags, an average of 23½ bags per acre. Again planted to cotton, the field produced 1½ bales per acre.

Mr. Wadsworth always tries to cover the land that was in peanuts with barnyard manure, if the peanut vines are removed from the land to be used for hay. Peanut vines are used for the main hay crop in this section. Removing both the nuts and vines from the land, makes peanuts a very exhaustive crop, particularly so if nothing is returned to the land or no winter cover crop is seeded to protect the land during the winter and add organic matter when turned under.

Where corn follows peanuts, Mr. Wadsworth plants soybeans in the corn for soil improvement. A good portion of the peanut land is seeded to vetch, winter peas, crimson clover, wheat, and rye. These crops are used for winter and early spring grazing, except part of the wheat which is harvested for a seed crop.

Peanuts, like other legumes, are heavy feeders on potash, and it is generally recognized that most of the fields in the area producing Virginia type peanuts are deficient in potash. Where cotton follows peanuts, potash hunger or cotton rust often develops in late summer if a liberal application of potash has not been made to the cotton crop. Even where rust does not appear, it is usually a good idea to add more potash than was formerly thought sufficient. Experiment station results and the experience of farmers indicate that even though peanuts need large amounts of potash it is most profitably applied to a crop such as cotton preceding peanuts in the rotation.



Potash-hunger signs in cotton: Left, normal leaf; center, margins affected; right, advanced stage, entire leaf affected.

Mr. Wadsworth fertilizes his cotton with 500 pounds of high-potash fertilizer per acre. He prefers 4-8-12 when he can get it. After the cotton has been chopped and worked out, he side-dresses it with 150 to 200 pounds of 10-0-10 per acre. He formerly used a 4-8-4 and top-dressed only with nitrate of soda, but four years ago he made two bales per acre where he fertilized part of a field with 4-8-12 and only a little more than a bale per acre from the part fertilized with 4-8-4, at the same rate per acre. The part of the crop receiving only 4 per cent potash had rust and the bolls did not develop as they did where 12 per cent potash was used. Since that time, he has been using more potash in growing cotton. The first time he made two bales of cotton per acre was when he fertilized the crop with 600 pounds of 3-8-3 and then side-dressed it with 300 pounds of 20 per cent Kainit per acre. This was a total of 78 pounds potash per acre.

In 1943, his crop was fertilized with 2-8-10 and side-dressed with 200 pounds of 10-0-10. On 40 acres he produced 71 bales which were equivalent to 75 bales averaging 500 pounds. A good portion of this crop averaged two bales per acre, but part of the crop was grown on land that he had been cultivating only a few years, which pulled the average down.

For the last four years, he has been cooperating with the County Agent in conducting a cotton variety test in which the best pedigreed and certified seed obtainable are compared side by side. From these tests he has found the strains that give best results on his farm and has made use of the information. The information has also been of great value to other farmers in the County. Based on previous variety tests, his main crop last year was planted in Coker 100, strain 3, but his crop this year was planted in Coker 100, strain 5, which is also the strain adopted by the Cotton Improvement Association in the County.

Most of Mr. Wadsworth's crops are produced by tenants. Tractors are used to prepare the land and some crops are cultivated with tractors. He uses big mules which are always fat. Both riding and walking one-row cultivators are used.

All his one-horse tenants made 10 bales of cotton, 240 or more bags of peanuts, and plenty of corn in 1943. One tenant, Leonard Williams, with two mules made 22 bales of cotton, 300 bags of peanuts, and 15 acres of corn averaging 35 bushels per acre. All of his tenants made money last year, receiving from $400 to $900 for their part of the crop above expenses, and he never has had to carry a tenant's account over from one year to the next, not even during the depression years. He has never been known to have any trouble with his tenants and has never had a tenant to leave owing him. He has the reputation of working the tenants more than the average farm does, but if one leaves, he usually wants to come back after having been away for a year. A tenant moved with him who had nothing to eat, and the reputation that he would not work. He was fed throughout the year and paid $500 at the end of the year for his part of the crop, after deducting his account. When he was paid off, this tenant said it was the first real money he had ever had.

Likes Cotton Best

A real farmer in producing all the crops which he grows, Mr. Wadsworth likes cotton better than any other crop. He grows very little tobacco and increased his cotton acreage this year. In producing his cotton crop, he is following the best recommended practices, including the use of the best adapted seed, good land built up through crop rotation, the use of manure and soil-building crops, seed treatment, adequate fertilizer, a good seedbed, boll-weevil control, good cultivation, and prompt picking of the cotton after it is open.

He began mopping cotton in 1939 with the 1-1-1 mixture and has kept it up each year since. He has made excel-

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Leslie Gilmore, Steveston, British Columbia, standing in the field which produced his record potato crop.

Producing A Record Potato Yield

By C. Tice

Field Crops Commissioner, Department of Agriculture, Victoria, British Columbia

MORE than 900 bushels of Netted Gem potatoes to the acre was the phenomenal yield officially recorded on the farm of Leslie Gilmore of Steveston, Lulu Island, British Columbia, last year. This is considered to be the highest yield per acre of potatoes obtained in Canada and is a world's record as far as the Netted Gem variety is concerned. Of the 901.3 bushels produced per acre, 883 bushels were of marketable grades.

The Netted Gem is a very popular potato in this coast Province and brings a premium on the market. It is a good yielder of excellent quality. The tubers are long to oval and elongated with shallow eyes and russet skin. The field which produced this record crop consisted of 33 acres and was entered in the crop competition held annually by the Columbia Potato Growers' Association, of which Mr. Gilmore is a member.

According to H. S. MacLeod, Federal District Certified Seed Potato Inspector for B. C. for the past ten years, potato crop competitions have been conducted annually by the Columbia Potato Growers' Association on Lulu Island at the mouth of the Fraser River. The objective of these competitions has been to increase the yield per acre, to improve the quality of the pota-

toes, to obtain more uniformity in type, to establish a better demand for the product, and to make the industry more profitable.

When one considers that the average yield of potatoes in B. C. is 185 bushels per acre, it is natural to ask how such a yield as Gilmore's is possible. In the first place, the soil is clay loam and is ideally suited for potato growing. It is well-drained and kept in a good state of fertility. A four-year rotation is practised; namely, potatoes, peas, hay, and pasture. Careful attention is paid to the fertility of the soil, cultural methods, and storage of the crop.

In this particular instance, the land was ploughed deeply in early January, cross-ploughed shortly before planting, and worked up to produce a mellow seed-bed. A liberal application of well-rotted barnyard manure (25 tons per acre) was disced in after the first ploughing. This was supplemented with one-half ton per acre of a 4-10-10 fertilizer, applied through the fertilizer attachment in the potato planter. The best procurable certified seed was used. The seed was cut before planting and two-ounce sets used. The date of planting was April 24 and harvesting took place on September 18. Eleven hundred pounds of seed per acre were used. The rows were 36 inches apart, and the sets were spaced 15 inches in the rows.

After the potatoes were planted, hillers were put on the back of the cultivator and the potatoes hilled up before they appeared above ground. This was followed immediately by cultivation of the bottom of the rows and then harrowing. This procedure was followed a second time just before the plants appeared, so as to keep weeds down. After the plants attained 3–4 inches growth, deep cultivation close to plants was practiced, followed by another cultivation two weeks later. The potatoes were then hilled and left until digging time. By such methods moisture was conserved to the fullest extent.

Five sprayings with a copper fungicide were made during the growing season. Fortunately, there are no potato beetles at the coast, and so it is not necessary to use an insecticide.

The peas used in the rotation on this farm are canning varieties, such as Early Surprise and Perfection, and are

Robert Bridge, Mr. Gilmore's nephew, operates a sugar beet seed planter which will plant four rows at once. At the right are Joe Maxwell, manager, and Mr. Gilmore.

Here are some of the 160 fine Holstein cows on Mr. Gilmore's farm.

grown under contract for a canning company. Needless to say, the peas help considerably in keeping up the nitrogen content of the soil. No commercial fertilizer is used for the pea crop, but a dressing of agricultural hydrated lime at the rate of 1,000 to 1,500 lbs. per acre is given just before seeding.

Mr. Gilmore finds that peas fit into his rotation very well. They are an early cash crop, and, in addition, the vines make good ensilage for dairy cows. They also make a good nurse crop for clover and grasses, as the crop is harvested during July and early August. The threshing of the peas and silo-filling are done in one operation. A good cutting of clover is obtained during September and October for late silo-filling or cutting as green feed for the dairy herd when pastures are poor.

Sugar-beet seed is another crop which is being grown on this farm. Just recently 34 acres have been seeded to this crop.

Mr. Gilmore's farm is located immediately adjacent to the south arm of the Fraser River, 12 miles from Vancouver. The average yearly rainfall in this area is 36.89 inches. The family has been farming on Lulu Island for many years. Three farms consisting of 500 acres altogether are being operated. One hundred sixty Holstein cows are milked and the milk is disposed of in nearby Vancouver. This year Mr. Gilmore has planted 65 acres of certified seed potatoes, consisting of the White Rose and Netted Gem varieties. He also has 18 acres of commercial White Rose.

In spite of his varied farming operations, Mr. Gilmore gives considerable time to the marketing of the farmers' produce. He is chairman of the B. C. Coast Vegetable Marketing Board. All potatoes grown at the coast are marketed through this Board. Fortunately, he has a competent farm manager in Joe Maxwell who has had extensive farming experience and knows "his spuds." Maxwell hails from Ireland and has been in close touch with the potato business all his life. He has both the practical and scientific knowledge which is so necessary to be a successful farmer these days.

Although the area of land under cultivation in British Columbia is rather small, compared with most other

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Fertilizing Soybeans In North Carolina

By W. E. Colwell

Agronomy Department, Agricultural Experiment Station, Raleigh, North Carolina

SOYBEANS are grown extensively on the dark, highly organic, imperfectly or poorly drained soils of the Lower Coastal Plain of North Carolina. It is common to fertilize them lightly, if at all, and to rotate with corn which is not heavily fertilized. The yields in many fields of this area are extremely low. It was under these conditions that certain experimental work was carried out in 1943, and, although the information on fertilizing soybeans is far from complete, it has seemed advisable to make available the experimental data which have a bearing on this problem.

Experiments were conducted in Pamlico and Pitt Counties on Portsmouth sandy loam and in Pender County on Dunbar silt loam. Analyses of soils from the three sites are presented in Table 1.

The field in Pamlico County had been cropped with corn for two years prior to 1943 and had been fertilized with 250 lbs. of 2-10-6 per acre in 1942 only. The results from the soybean experiment are presented in Table 2. The application of 36 lbs. K_2O per acre (side-dressed) resulted in an increase in yield of 8.2 bushels per acre. There was no further increase from the 60-lb. application. The addition of lime (1,000 lbs. dolomite in the row) was without effect. The response from phosphate was not significant. Data not reported show that borax broadcast at the rates of 5

TABLE 1.—ANALYSES OF SOILS [1] FROM EXPERIMENTAL FIELDS

Location and soil type		pH	Base Exch. Cap.	Ca		Mg		K		P	O.M.
			ME/ 100g	ME/ 100g	Lbs/A $CaCO_3$ Equiv alent	ME/ 100g	Lbs/A MgO	ME. 100g	Lbs/A K_2O	Lbs/A P_2O_5	%
Pamlico County Portsmouth s. l	Surface....	5.1	7.44	2.64	2640	.48	195	.08	75	127	2.2
	Subsoil....	4.8	7.83	1.97	1970	.29	115	.06	55	trace	1.3
Pitt County Portsmouth s. l.	Surface....	4.9	9.39	2.99	2990	.43	175	.08	75	154	3.4
	Subsoil....	5.1	6.39	2.75	2750	.19	75	.08	75	trace	1.7
Pender County L. C. P. Sta. Sunbar s. l.	Surface....	4.6	7.51	1.40	1400	.34	135	.06	55	140	2.6
	Subsoil....	4.2	7.58	1.00	1000	.36	145	.08	75	trace	.4

(1) Values are averages of four check plots. Analyses made under the supervision of J. R. Piland, Associate Soil Chemist. Exchange capacity by ammonium acetate extraction, phosphorus by .002 N H_2SO_4 extraction, and O. M. by Walkley-Black method.

TABLE 2.—YIELDS AND OIL CONTENTS* OF SOYBEANS (TOKIO) GROWN ON PORTSMOUTH SANDY LOAM IN PAMLICO COUNTY

Treatment	Yield Bu/A	Oil Content %
(1) (2) (3)		
Lime—Phosphate—60 lbs. K_2O	27.8	18.0
Lime—Phosphate—36 lbs. K_2O	27.7	17.9
Lime—Phosphate— —	19.5	17.0
— —Phosphate—36 lbs. K_2O	26.0	18.0
Lime— — —36 lbs. K_2O	24.6	17.9
No fertilizer	20.7	.....
Significant difference (.05)	7.3	.71

(1) Lime—1,000 lbs. dolomitic lime in the row.
(2) Phosphate—48 lbs. P_2O_5 per acre from treble superphosphate in the row.
(3) K_2O from 62% muriate of potash side-dressed before the first cultivation.
* Oil determinations made under the supervision of J. R. Piland, Associate Soil Chemist.

lbs. and 10 lbs. per acre was without effect. Similarly, 125 lbs. hydrated copper sulfate per acre broadcast before planting and 25 lbs. per acre in the row did not affect yields.

The field in Pitt County is reported to have been in corn and soybeans for at least 25 years. In 1942, it was planted to soybeans and no fertilizer was added. In 1941, it was in corn to which 75 to 100 lbs. nitrate of soda per acre were added. The results of the experiment presented in Table 3 show that as applications of potash were increased from 12 to 36 to 60 lbs. K_2O per acre on the uniformly limed plots (3,000 lbs. per acre broadcast), yields were increased progressively, but only to 11.2 bushels per acre. On all these plots, foliar symptoms of potash deficiency were present throughout the summer. It should be noted that without lime the plots receiving 36 lbs. K_2O per acre yielded slightly higher than those receiving the 60-lb. rate with lime. Furthermore, potash-deficiency symptoms were less pronounced where lime was omitted. It is apparent that on this

TABLE 3.—YIELDS AND OIL CONTENTS OF SOYBEANS (WOODS YELLOW) GROWN ON PORTSMOUTH SANDY LOAM IN PITT COUNTY

Treatment	Yield Bu/A	Oil Content %
(1) (2) (3)		
Lime—Phosphate—60 lbs. K_2O	11.2	16.0
Lime—Phosphate—36 lbs. K_2O	9.3	15.9
Lime—Phosphate—12 lbs. K_2O	6.5	15.1
Lime—Phosphate— —	5.4	14.5
— —Phosphate—36 lbs. K_2O	11.9	15.8
Lime— — —36 lbs. K_2O	9.3	16.2
Significant difference (.05)	3.0	1.1

(1) Lime—3,000 lbs. dolomitic lime per acre broadcast and plowed in just before planting.
(2) Phosphate—48 lbs. P_2O_5 per acre from treble superphosphate in the row.
(3) K_2O from 62% muriate of potash side-dressed before the first cultivation.

particular soil the additions of lime did not increase yields, but that high rates of lime accentuated potash deficiency. This is in line with other work, although it was not thought originally that lime had been added at a rate high enough to have this effect. It will be noted that the application of phosphate on this soil did not increase yields.

Adequately fertilized soybeans growing in the Coastal Plain area of North Carolina.

The third experiment was conducted at the Lower Coastal Plain Branch station on a field which had been planted to corn in 1942 and fertilized with 400 lbs. of 4-8-4 per acre. The general level of fertility was somewhat higher than that at the other two locations. The results of this experiment are presented in Table 4. It will be noted that potash was the only added fertilizer to give an increase in yield. Thirty-six pounds K_2O per acre caused an increase of 7.1 bushels per acre and there was no further increase with 60 pounds. Calcium hydroxide was without benefit although there was an early vegetative stimulation. It is interesting to note that the lime added to this soil did not induce potash deficiency as indicated by foliar symptoms or as measured by yields. The calcium level of this soil was relatively low at the outset, 1.4 M. E. per 100 grams soil, as compared to 3.0 M. E. in Pitt County experiment (Table 1).

It is apparent that potash was a major limiting factor in these fields which were selected without previous knowledge of any mineral deficiency. Foliar symptoms of potash deficiency were overcome and yields were increased by potash applications. The occurrence of potash-deficiency symptoms on soybeans in the Coastal Plain is widespread, and this fact, together with the experimental results reported above, support the con-

(*Turn to page* 44)

TABLE 4.—YIELD OF SOYBEANS (OGDEN) ON DUNBAR SILT LOAM AT THE L. C. P. BRANCH STATION

Treatment	Yield Bu/A
(1) (2) (3)	
Lime—Phosphate—60 lbs. K_2O	29.8
Lime—Phosphate—36 lbs. K_2O	32.6
Lime—Phosphate	25.5
— —Phosphate—36 lbs. K_2O	29.3
Lime— —36 lbs. K_2O	31.2
Required for significance (.05)	6.9

(1) Lime—Hydrated lime 2,738 lbs. per acre (equivalent to 3,700 lbs. limestone) broadcast and plowed in just before planting.
(2) Phosphate—24 lbs. P_2O_5 per acre from treble superphosphate in the row.
(3) K_2O from 62% muriate of potash top-dressed before the first cultivation.

Fertilizing For Yield And Soil Improvement

By R. E. Stephenson

Soils Department, Oregon State College, Corvallis, Oregon

THE amount as well as the kind of fertilizer to use on any particular crop is critically important for producing good yields, without which the principal incentive for the use of fertilizers would be lost. One hundred bushels of corn in the entire plant contains the equivalent nitrogen, phosphorus, and potassium supplied by more than 1,500 pounds of commercial fertilizer made up from nitrate of soda, superphosphate, and muriate of potash. Land must be naturally fertile or it must be enriched by liberal fertilization, and other factors such as moisture must be right, to produce 100 bushels of corn. Use of a small amount of fertilizer under the most favorable conditions probably will not result in a 100-bushel yield on land that has a 50-bushel natural capacity. To produce the extra 50 bushels and bring the yield to 100 bushels, if such a yield is possible, the corn must be enabled in some way to obtain nutrients equivalent to more than 750 pounds of fertilizer.

Effective fertilization of corn on Vigo silt loam is indicated by results from the Indiana Experiment Station, although 100-bushel production was not attained. With 150 pounds of 2-12-6 in the row the yield was 18 bushels, showing no increase over the unfertilized corn. With an additional 500 pounds of 10-10-10 used in plowsole application, the yield was 37 bushels an acre. Use of 1,000 pounds of 10-10-10 brought the yield to 54 bushels, and 1,500 pounds yielded nearly 70 bushels an acre. Thus, while a light application in the row had no effect, an adequate amount properly placed produced good increases of four to six bushels of corn for each 100 pounds of fertilizer.

The common rates of farm application of fertilizer, therefore, are often much too small to produce the big yields that the best soils, well fertilized and managed, are capable of producing. Corn is about average in its nutrient requirements, and other crops to produce big yields would have similar heavy demands for nutrients. Nitrogen, phosphorus, and potassium are only three of the eleven elements that crops take from the soil. Any one of the eleven essential nutrient elements coming from the soil may need supplementing before big yields can be obtained. Successful use of fertilizers depends in part upon correctly tracking down the one or more deficiencies that is limiting production.

Fertilizer Residue

Seldom, if ever, is all the nutrient supplied in fertilizer used by the immediate crop. A residue remains in the soil which will presumably have an effect upon future crops. Two-thirds or more of the phosphorus supplied in fertilizer may be fixed by the soil. If only the phosphorus needs of a 100-bushel corn crop were supplied entirely from fertilizer, 300 pounds of superphosphate per acre might suffice. Probably twice this much more must be used to satisfy soil fixation. Not fixation, however, but economic re-

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PICTORIAL

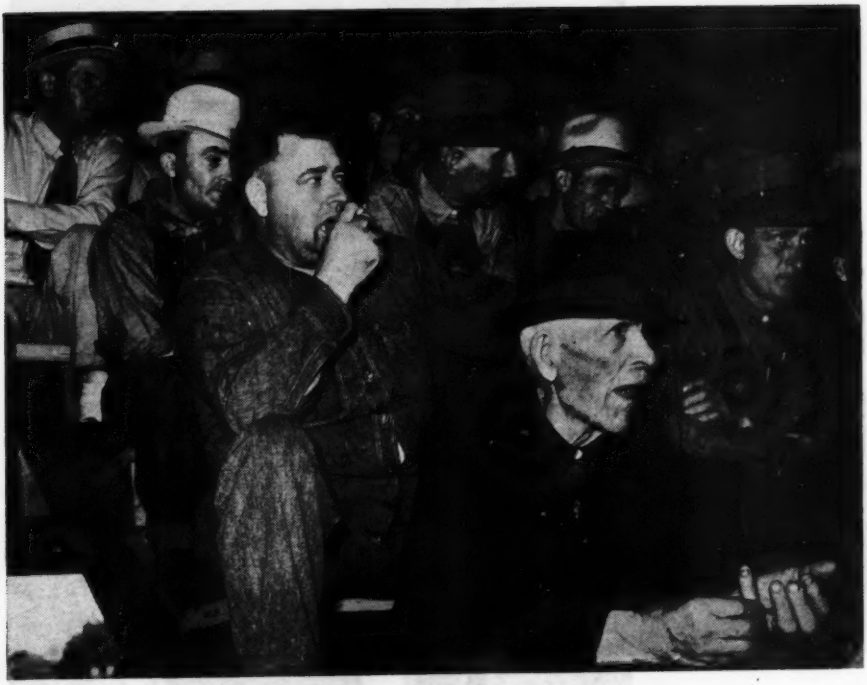
Getting ready for the judge.

Left: Blue is a thrilling color.

Below: A test of real cooperation.

Above: Fall plowing eases spring work.

Right: Nature provides a winter cover.



Above: A farm auction provides many tense moments.

Below: Anticipating another record American crop.

The Editors Talk

Isolationism

To those who are following the magnitudinous problems of post-war planning it is obvious that isolationism is a thing of the past. No longer can a nation, an industry, or an individual find solace in the thought that his welfare must not necessarily consider the welfare of others. We are being enlightened by erudite analyses of these inter-relationships and exposed to principles from which a higher civilization should spring. We are learning to look at the other fellow's problems when looking into our own.

In the post-war planning for agriculture—in which every American farmer and agriculturist is more immediately concerned—it is no surprise, therefore, to find emphasized over and over again that a prosperous agriculture will depend upon an all-out industrial production as well. War Food Administrator Marvin Jones says it this way: "Agriculture and industry are the twin evangels of modern civilization. Neither can prosper without the other. If one languishes, sooner or later the other will feel the effect. The farmer and livestock producer furnish the raw material, and in turn, if prosperous, help furnish a wider market for the finished article. At the same time, if the factory wheels are turning, they afford a market for the products of agriculture. Labor is vitally affected by any adverse effects that touch either wing of our national effort."

Secretary of Agriculture Claude R. Wickard lists as first and most important of three conditions which must be met to assure a demand for all of our farm production on a sound and permanent basis, a full employment in this country at fair wages and salaries, so that people will have the money in their pockets to buy the farm products they want and need. That, incidentally, he says, is the reason why agriculture is so deeply interested in the non-agricultural problems of post-war planning, for full domestic employment would provide a market for most of the things our farmers will be able to produce.

But probing to the bottom of all of these analyses of inter-dependencies, we come to the one great fundamental, the basis of all well-being, the SOIL. It is encouraging to see the general recognition of this truth and the place which soil management is accorded in all post-war planning. Judge Jones has said, "But whatever is done, whatever plans we may make, or whatever genius we may possess, our nation must perish unless we take care of the soil. The soil is our natural heritage. Wisely used, its value, its life-giving strength, its productivity are ageless. The children of the future have a stake in this, our greatest natural resource. We have a right to use the soil and other natural resources. We have no right to abuse them. They can be made to grow stronger and more productive and be left to coming generations in richer and better form than when they came to us. We want to keep this nation a land of abundance and opportunity."

There is no isolationism in such thinking. A well-nourished soil produces a

well-nourished people—a people eager to incorporate the principles upon which a higher world civilization must rise. To that end, the importance being given to soil conservation and management in all post-war planning is more than justified.

Soil Fertility Is A Good Investment

"Farmers who are planning to buy more land now at high prices might better heed the advice of Benjamin Franklin written many years ago in his Poor Richard's Almanac: 'A deposit of fertility in the soil bank is safest and pays the best.' " says L. B. Miller, Assistant Chief, Soil Experiment Fields, University of Illinois College of Agriculture. As Mr. Miller points out, Franklin's advice is especially appropriate now since limestone, phosphate, potash and other materials which build up the productivity of the soil are cheap in relation to the prices of crops and other farm products. He believes that those who have not already taken advantage of this opportunity to bring their soil to a high state of fertility should do so and thus accumulate a reserve to fall back upon when prices are low again.

Fortunately limestone, phosphate, and potash are lost only very slowly from the soil if a good crop rotation is used. Moderate reserves of these materials should be "stored" in the soil so there will always be plenty within easy reach of the plant roots. The best time to restock the supply is when a good bargain can be secured, is the advice of this soils specialist.

"In some localities it is very difficult to get limestone or other fertilizer materials delivered. War bonds bought now and earmarked for that purpose will assure a soil improvement program after the war and will be much safer than a speculative investment in high-priced land. The purchase of fertilizer materials or of war bonds instead of land will also help to offset the present tendency toward inflationary values of farm land," is Mr. Miller's opinion.

THERE is but one person whose welfare is as vital to the welfare of the whole country as is that of the wage worker who does manual labor, and that is the tiller of the soil,—the farmer. If there is one lesson taught by history it is that the permanent greatness of any State must ultimately depend more upon the character of its country population than upon anything else. No growth of cities, no growth of wealth, can make up for a loss in either the number or the character of the farming population. In the United States more than in almost any other country we should realize this and should prize our country population. When this Nation began its independent existence it was as a nation of farmers. The towns were small and were for the most part mere sea-coast trading and fishing ports. The chief industry of the country was agriculture and the ordinary citizen was in some way connected with it. In every great crisis of the past a peculiar dependence has had to be placed upon the farming population; and this dependence has hitherto been justified. But it cannot be justified in the future if agriculture is permitted to sink in the scale as compared with other employments.—THEODORE ROOSEVELT.

Farm Prices of Farm Products*

	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
1910–14 Average	12.4	10.4	69.6	87.6	64.8	88.0	11.94	21.59	....
1920	32.1	17.3	249.5	175.7	144.2	224.1	21.26	51.73	....
1921	12.3	19.5	103.8	118.7	58.7	119.0	12.96	22.18	....
1922	18.9	22.8	96.7	104.8	58.5	103.2	11.68	35.04	....
1923	26.7	19.0	84.1	104.4	80.1	98.9	12.29	43.69	....
1924	27.6	19.0	87.0	137.0	91.2	110.5	13.28	38.34	....
1925	22.1	16.8	113.9	171.6	99.9	151.0	12.54	35.07	....
1926	15.1	17.9	185.7	156.3	69.9	135.1	13.06	27.20	....
1927	15.9	20.7	132.3	114.0	78.8	120.5	12.00	28.56	....
1928	18.6	20.0	82.9	112.3	89.1	113.4	10.63	37.70	....
1929	17.7	18.6	93.7	118.4	87.6	102.7	11.56	34.98	....
1930	12.4	12.9	124.4	115.8	78.0	80.9	11.31	26.25	....
1931	7.6	8.2	72.7	92.9	49.8	48.8	9.76	17.04	....
1932	5.8	10.5	43.3	57.2	28.1	38.8	7.53	9.74	....
1933	8.1	12.9	66.0	59.4	36.5	58.1	6.81	12.32	....
1934	12.0	17.1	68.0	79.1	61.3	79.8	10.67	26.12	....
1935	11.6	16.1	49.4	73.9	77.4	86.4	10.57	35.56	....
1936	11.7	17.2	99.6	85.3	76.7	96.0	8.93	31.78	....
1937	11.1	19.9	88.3	91.8	94.8	107.1	10.36	30.24	....
1938	8.3	17.2	55.5	76.9	49.0	66.1	7.55	21.13	....
1939	8.7	13.6	68.1	75.4	47.6	63.6	6.95	22.17	....
1940	9.6	15.1	70.7	85.2	59.0	73.9	7.62	24.31	....
1941	13.3	19.1	64.6	94.4	64.3	84.0	8.10	35.04	....
1942	18.51	28.3	110.0	108.3	79.5	101.8	10.05	44.42	....
1943									
August	19.81	38.4	159.0	276.0	109.0	127.0	12.20	50.90	....
September	20.20	37.2	134.0	231.0	109.0	130.0	12.90	51.90	....
October	20.28	41.8	128.0	196.0	107.0	135.0	13.70	52.50	....
November	19.40	44.5	133.0	177.0	105.0	137.0	14.50	52.50	....
December	19.85	42.4	135.0	188.0	111.0	143.0	15.20	52.60	....
1944									
January	20.15	41.5	141.0	202.0	113.0	146.0	15.70	52.80	....
February	19.93	25.1	139.0	211.0	113.0	146.0	15.90	52.60	....
March	19.97	21.9	137.0	220.0	114.0	146.0	16.00	52.70	....
April	20.24	23.8	137.0	229.0	115.0	147.0	16.20	52.50	....
May	19.80	37.2	134.0	236.0	115.0	147.0	16.10	52.50	....
June	20.16	49.2	125.0	235.0	115.0	143.0	15.00	52.80	....
July	20.32	45.0	138.0	230.0	117.0	139.0	13.90	53.00	....
August	20.15	39.3	159.0	258.0	117.0	135.0	14.30	53.20	....
Index Numbers (1910-14 = 100)									
1920	259	166	358	201	223	255	178	240	....
1921	99	187	149	136	91	135	109	103	....
1922	152	219	139	120	90	117	98	162	....
1923	215	183	121	119	124	112	103	202	....
1924	223	183	125	156	141	126	111	177	150
1925	178	161	164	196	154	172	105	162	153
1926	122	172	267	178	108	154	109	126	143
1927	128	199	190	130	122	137	101	132	121
1928	150	192	119	128	138	129	89	175	159
1929	143	179	135	135	135	117	97	162	149
1930	100	124	179	132	120	92	95	122	140
1931	61	79	104	106	77	55	82	79	117
1932	47	101	62	65	43	44	63	45	102
1933	65	124	95	68	56	66	57	57	105
1934	97	164	98	90	95	91	89	121	104
1935	94	155	71	84	119	98	80	165	126
1936	94	165	143	97	118	109	75	147	113
1937	90	191	127	105	146	122	87	140	122
1938	67	165	80	88	76	75	63	98	101
1939	70	131	98	86	73	72	58	103	109
1940	78	145	102	97	91	84	64	126	121
1941	107	184	93	108	99	95	68	162	145
1942	149	272	158	124	123	116	84	206	199
1943									
August	160	369	228	315	168	144	102	236	308
September	163	358	193	264	168	148	108	240	311
October	164	402	184	224	165	153	115	243	264
November	156	428	191	202	162	156	121	243	254
December	160	408	194	215	171	163	127	244	208
1944									
January	163	399	203	231	174	166	131	245	231
February	161	241	200	241	174	166	133	244	204
March	161	211	197	251	176	166	134	244	191
April	163	229	197	261	177	167	136	243	184
May	160	358	193	269	177	167	135	243	217
June	163	473	180	266	177	163	126	245	245
July	164	433	198	263	181	158	116	245	236
August	163	378	228	295	181	153	120	246	253

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N /bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11-12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Fish scrap, wet acidulated, 6% ammonia, 3% bone phosphate f.o.b. factory bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16-17% ammonia, Chicago, bulk, per unit N
1910-14	$2.68	$2.85	$3.50	$3.53	$3.05	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	3.54	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.25	4.59	5.16
1924	2.99	2.44	5.87	5.02	4.41	3.60	4.25
1925	3.11	2.47	5.41	5.34	4.71	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.15	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.35	4.32	5.70
1928	2.67	2.30	7.06	6.63	5.28	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.69	4.61	5.72
1930	2.47	1.81	4.78	4.96	4.15	3.79	4.58
1931	2.34	1.46	3.10	3.95	3.33	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.82	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.58	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.84	2.67	3.27
1935	1.47	1.15	4.59	3.10	2.65	3.06	3.65
1936	1.53	1.23	4.17	3.42	2.67	3.58	4.25
1937	1.63	1.32	4.91	4.66	3.65	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.17	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.12	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.35	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.27	3.76	4.43
1942	1.74	1.41	6.11	5.77	3.34	5.04	6.76
1943							
August	1.75	1.42	6.30	5.77	3.34	4.86	6.71
September	1.75	1.42	6.30	5.77	3.34	4.86	6.71
October	1.75	1.42	6.29	5.77	3.34	4.86	6.71
November	1.75	1.42	6.29	5.77	3.34	4.86	6.71
December	1.75	1.42	7.39	5.77	3.34	4.86	6.71
1944							
January	1.75	1.42	7.40	5.77	3.34	4.86	6.71
February	1.75	1.42	7.40	5.77	3.34	4.86	6.71
March	1.75	1.42	7.61	5.77	3.34	4.86	6.71
April	1.75	1.42	7.50	5.77	3.34	4.86	6.71
May	1.75	1.42	7.81	5.77	3.34	4.86	6.71
June	1.75	1.42	7.81	5.77	3.34	4.86	6.71
July	1.75	1.42	7.81	5.77	3.34	4.86	6.71
August	1.75	1.42	7.81	5.77	3.34	4.86	6.71
Index Numbers (1910-14 = 100)							
1922	113	90	173	132	117	140	142
1923	112	102	177	137	140	136	147
1924	111	86	168	142	145	107	121
1925	115	87	155	151	155	117	135
1926	113	84	126	140	136	129	139
1927	112	79	145	166	143	128	162
1928	100	81	202	188	173	146	170
1929	96	72	161	142	154	137	162
1930	92	64	137	141	136	112	130
1931	88	51	89	112	109	63	70
1932	71	36	62	62	60	36	39
1933	59	39	84	81	85	97	71
1934	59	42	127	89	93	79	93
1935	57	40	131	88	87	91	104
1936	59	43	119	97	89	106	121
1937	61	46	140	132	120	120	122
1938	63	48	105	106	104	93	100
1939	63	47	115	125	102	115	111
1940	63	48	133	124	110	99	96
1941	63	49	157	151	107	112	126
1942	65	49	175	163	110	150	192
1943							
August	65	50	180	163	110	144	191
September	65	50	180	163	110	144	191
October	65	50	180	163	110	144	191
November	65	50	180	163	110	144	191
December	65	50	211	163	110	144	191
1944							
January	65	50	211	165	110	144	191
February	65	50	211	163	110	144	191
March	65	50	217	163	110	144	191
April	65	50	214	163	110	144	191
May	65	50	223	163	110	144	191
June	65	50	223	163	110	144	191
July	65	50	223	163	110	144	191
August	65	50	223	163	110	144	191

Wholesale Prices of Phosphates and Potash**

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Kainit, 20% bulk, per unit, c.i.f. Atlantic and Gulf ports[1]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657	$0.655
1922	.566	3.12	6.90	.632	.904	23.87	....	.508
1923	.550	3.08	7.50	.588	.836	23.32	....	.474
1924	.502	2.31	6.60	.582	.860	23.72	....	.472
1925	.600	2.44	6.16	.584	.860	23.72	....	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537	.524
1927	.535	3.09	5.50	.646	.924	25.55	.586	.581
1928	.580	3.12	5.50	.669	.957	26.46	.607	.602
1929	.609	3.18	5.50	.672	.962	26.59	.610	.605
1930	.542	3.18	5.50	.681	.973	26.92	.618	.612
1931	.485	3.18	5.50	.681	.973	26.92	.618	.612
1932	.458	3.18	5.50	.681	.963	26.90	.618	.591
1933	.434	3.11	5.50	.662	.864	25.10	.601	.565
1934	.487	3.14	5.67	.486	.751	22.49	.483	.471
1935	.492	3.30	5.69	.415	.684	21.44	.444	.488
1936	.476	1.85	5.50	.464	.708	22.94	.505	.560
1937	.510	1.85	5.50	.508	.757	24.70	.556	.607
1938	.492	1.85	5.50	.523	.774	25.17	.572	.623
1939	.478	1.90	5.50	.521	.751	24.52	.570	.607
1940	.516	1.90	5.50	.517	.730	....	.573	....
1941	.547	1.94	5.64	.522	.779	25.55	.570	....
1942	.600	2.13	6.29	.522	.809	25.74	.205	....
1943								
August	.640	2.00	5.90	.503	.797	26.00	.188	....
September	.640	2.00	5.90	.503	.797	26.00	.188	....
October	.640	2.00	5.90	.535	.797	26.00	.200	....
November	.640	2.00	5.90	.535	.797	26.00	.200	....
December	.640	2.00	6.10	.535	.797	26.00	.200	....
1944								
January	.640	2.00	6.10	.535	.797	26.00	.200	....
February	.640	2.00	6.10	.535	.797	26.00	.200	....
March	.640	2.00	6.10	.535	.797	26.00	.200	....
April	.640	2.00	6.10	.535	.797	26.00	.200	....
May	.640	2.00	6.10	.535	.797	26.00	.200	....
June	.640	2.00	6.10	.471	.701	22.88	.176	....
July	.640	2.00	6.10	.503	.797	26.00	.188	....
August	.640	2.00	6.10	.503	.797	26.00	.188	....

Index Numbers (1910-14 = 100)

1922	106	87	141	89	95	99	....	78
1923	103	85	154	82	88	96	....	72
1924	94	64	135	82	90	98	....	72
1925	110	68	126	82	90	98	....	74
1926	112	88	114	83	90	98	82	80
1927	100	86	113	90	97	106	89	89
1928	108	86	113	94	100	109	92	92
1929	114	88	113	94	101	110	93	92
1930	101	88	113	95	102	111	94	93
1931	90	88	113	95	102	111	94	93
1932	85	88	113	95	101	111	94	90
1933	81	86	113	93	91	104	91	86
1934	91	87	110	68	79	93	74	72
1935	92	91	117	58	72	89	68	75
1936	89	51	113	65	74	95	77	85
1937	95	51	113	71	79	102	85	93
1938	92	51	113	73	81	104	87	95
1939	89	53	113	73	79	101	87	93
1940	96	53	113	72	77	....	87	....
1941	102	54	110	73	82	106	87	....
1942	112	59	129	73	85	106	84	....
1943								
August	119	55	121	70	84	108	82	....
September	119	55	121	70	84	108	82	....
October	119	55	121	75	84	108	83	....
November	119	55	121	75	84	108	83	....
December	119	55	125	75	84	108	83	....
1944								
January	119	55	125	75	84	108	83	....
February	119	55	125	75	84	108	83	....
March	119	55	125	75	84	108	83	....
April	119	55	125	75	84	108	83	....
May	119	55	125	75	84	108	83	....
June	119	55	125	66	74	95	80	....
July	119	55	125	70	84	108	82	....
August	119	55	125	70	84	108	82	....

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought**	Wholesale prices of all commodities†	Fertilizer materials‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash
1922.....	132	149	141	116	101	145	106	85
1923.....	142	152	147	114	107	144	103	79
1924.....	143	152	143	103	97	125	94	79
1925.....	156	157	151	112	100	131	109	80
1926.....	145	155	146	119	94	135	112	86
1927.....	139	153	139	116	89	150	100	94
1928.....	149	155	141	121	87	177	108	97
1929.....	146	153	139	114	79	146	114	97
1930.....	126	145	126	105	72	131	101	99
1931.....	87	124	107	83	62	83	90	99
1932.....	65	107	95	71	46	48	85	99
1933.....	70	109	96	70	45	71	81	95
1934.....	90	123	109	72	47	90	91	72
1935.....	108	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	121	130	126	81	50	129	95	75
1938.....	95	122	115	78	52	101	92	77
1939.....	93	121	112	79	51	119	89	77
1940.....	98	122	115	80	52	114	96	77
1941.....	122	130	127	86	56	130	102	77
1942.....	157	152	144	93	57	161	112	77
1943								
August....	193	169	150	94	57	160	119	74
September.	193	169	150	94	57	160	119	74
October...	192	170	150	95	57	160	119	78
November.	194	171	150	95	57	160	119	78
December..	196	173	150	96	57	171	119	78
1944								
January....	196	174	150	96	57	171	119	78
February..	195	175	151	96	57	171	119	78
March.....	196	175	151	97	57	173	119	78
April.....	196	175	152	96	57	172	119	78
May	194	175	152	97	57	175	119	78
June.....	193	176	151	95	57	175	119	69
July.....	192	176	152	96	57	175	119	74
August....	193	176	151	96	57	175	119	74

* U. S. D. A. figures.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning with June 1941, manure salts prices are F. O. B. mines, the only basis now quoted.

** The annual average of potash prices is higher than the weighted average of prices actually paid because since 1926 better than 90% of the potash used in agriculture has been contracted for during the discount period. From 1937 on, the maximum seasonal discount has been 12%.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Save Barnyard Manure," Ext. Serv., Univ. of Ark., Fayetteville, Ark., Leaf. 44, (Rev. 1944), Charles F. Simmons.

"Homemade Fertilizer Spreaders," Ext. Serv., Univ. of Ark., Fayetteville, Ark., E. Plan Series No. 6, March 1944, Earle K. Rambo.

"Agricultural Gypsum in California," Dept. of Agr., Sacramento 14, Calif., FM-90, Aug. 17, 1944.

"Commercial Fertilizers Agricultural Minerals 1943," Dept. of Agr., Sacramento 14, Calif., Sp. Publ. No. 203, Alvin J. Cox.

"Annual Report for the Calendar Year 1943," Dept. of Agr., Sacramento 14, Calif., Alvin J. Cox.

"Suggested Fertilizers for 1944-45," Agron. Dept., Univ. of Conn., Storrs, Conn., July 26, 1944.

"Fertilizer, Feed, and Seed Report, January-June, 1944," State Board of Agriculture, Dover, Delaware.

"Fertilizer Materials Used in Florida for Fiscal Year July 1, 1943 Thru June 30, 1944," Fert. Statistical Div., Bureau of Inspection, Tallahassee, Fla.

"Fertilizers—What They Are and How to Use Them," Agr. Exp. Sta., Mich. State College, East Lansing, Mich., Sp. Bul. 133 (Rev.), March 1944, C. E. Millar and L. M. Turk.

"Nitrogen Fixation, Composition and Growth of Soybeans in Relation to Variable Amounts of Potassium and Calcium," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Res. Bul. 381, April 1944, Herbert E. Hampton and W. A. Albrecht.

"1944 Fertilizer Recommendations for Wheat, Other Fall-Sown Grains, and Permanent Pastures," Agr. Ext. Serv., Ohio State Univ., Columbus, Ohio, No. 257, July 1944, Earl Jones and Robert E. Yoder.

"Pasture Fertilization," Agr. Exp. Sta., State College, Pa., Bul. 460, Jan. 1944, Charles F. Noll, S. I. Bechdel, P. S. Williams, S. R. Skaggs, and M. A. Hein.

"Fertilizer Grades and Rates of Application 1944-45," Agr. Exp. Sta., R. I. State College, Kingston, R. I., July 1944.

"Distribution of Fertilizer Sales in Texas for 1942-3," Agr. Exp. Sta., A. & M. College, College Station, Texas, Nov. 11, 1943, A. D. Jackson.

"Lime Facts," Agr. Ext. Serv., Blacksburg, Va., Cir. E-382, June 1944.

Soils

¶ Helpful and practical information on the management of soils in lower central New York State that is applicable to wider areas of similar conditions is given by A. F. Gustafson in New York (Cornell) Agricultural Experiment Station Bulletin 789 entitled, "Soil and Field-Crop Management for the Catskill-Mohawk Area of New York." The topography is rolling to rough, and dairying is the principal type of agriculture. The general soils are described and a table gives the principal characteristics of the soil series found in the area. Many of the soils are acid and require lime for growing good crops of legumes. Most of the soils are deficient in phosphate and some are deficient in potash, especially the lighter soils that have not received heavy applications of manure. Manure should be carefully conserved and utilized, supplemented with superphosphate and with potash also on the lighter soils and others that are deficient in potash. The author brings out that if manure is not carefully handled a great deal of its value may be lost, particularly the nitrogen and potash portions.

Borax is likely to be needed in growing alfalfa, cauliflower, and possibly other crops. The use of manure from animals being fed with boron-deficient forage will not aid in overcoming boron deficiency. The author recommends that wherever boron deficiency symptoms exist, particularly a yellowing of

the upper leaves of alfalfa, a trial be made by applying borax at the rate of 30 to 40 lbs. per acre on a strip two or more rods wide across the field. Overlapping half the borax-treated area, 200 lbs. per acre of muriate of potash should be applied, so that there then will be an area with borax alone, borax and potash, and potash alone. It is recommended that the applications be made either early in the spring or after the first cutting. Since potash frequently is deficient on fields growing alfalfa, both the borax and the potash should be used in the trials.

The heavy removal of potash from the soil in growing alfalfa is stressed with the statement that a three-ton crop of alfalfa contains as much potash as a 200-lb. application of 60% muriate of potash. A 10-ton application of good manure will furnish only 100 lbs. of potash or about enough to make a good 2-ton crop of alfalfa. On potash-deficient soils, therefore, this application of manure would not take care of the removal by the crop, and an extra application in the form of potash fertilizer would be necessary to maintain fertility.

Information is given on the management and fertilization of pastures. Again it is brought out that practically all areas will require phosphorus while unmanured sandy soils and perhaps some silt loams will also respond to potash. It is recommended that top-dressings of lime, phosphorus, and potash be made on permanent pastures. Brief remarks on the use of forests in utilizing the soils of the area complete the bulletin.

"Plant Succession on Burned Chaparral Lands in Northern California," Agr. Exp. Sta., Univ. of Calif., Berkeley, Calif., Bul. 685, March 1944, Arthur W. Sampson.

"How to Farm on the Contour," Ext. Serv., Univ. of Ill., Urbana, Ill., Cir. 575, April 1944.

"Salty Soils in Texas," Agr. Exp. Sta., A. & M. College, College Station, Texas, Dec. 1, 1943, G. S. Fraps.

"Vanderburgh County Indiana, Soil Survey," U. S. D. A., Washington, D. C., Series 1939, No. 2, June 1944, A. J. Vessel, J. G. Wade, and Sutton Myers.

"Billings County North Dakota, Soil Survey," U. S. D. A., Washington, D. C., Series 1934, No. 25, June 1944, M. J. Edwards and J. K. Ableiter.

"Dry Land Rotation and Tillage Experiments at the Akron (Colorado) Field Station," U. S. D. A., Washington, D. C., Cir. 700, May 1944, J. F. Brandon and O. R. Mathews.

"Thomas Jefferson Soil Conservationist," U. S. D. A., Washington, D. C., Mis. Publ. 548, April 1944, Hugh H. Bennett.

Crops

¶ Results produced by different cotton varieties for 1943 and, in some cases, averages of a period of years when the crop is grown in various sections of Georgia are compared in Circular 144 of the Georgia Experiment Station, "Cotton Variety Tests in Georgia, 1938-1943," by R. P. Bledsoe, W. W. Ballard, and A. L. Smith. Over a five-year period, Coker 100, Stoneville 2B Coker 4 in 1, Deltapine, and Hibred gave good results, in the order listed. Empire varieties are now showing up favorably in many cases and Coker Wilds is giving a high return because of the present high premiums for long-staple cotton. In south Georgia, Coker 100 Wilt has given excellent results under a wide variety of conditions. On soils that are not subject to trouble from Fusarium or nematode wilts, the Stoneville 2B and Deltapine 14 varieties do very well. On soils that are troubled with root-knot and cotton wilt, the use of proper rotation and fertilization as well as suitable cotton varieties will be very helpful. One or two crops of peanuts or crotalaria with not more than two cotton crops in a three- to five-year rotation will usually reduce trouble from these diseases. Varieties such as Stone-wilt, Coker 100, Coker 4 in 1, Cook, and others are resistant to wilt. Most of the wilt-resistant varieties are likewise resistant to root-knot. Other varieties particularly resistant to root-knot are S and C2, Coker 4 in 1-6 CCS 340-7, and Wannamaker Cleveland. It is brought out by the author that in rotating cotton with peanuts, the soil may become quite deficient in potash unless care is taken to supply plenty of this nutrient. Where potash

is not applied to the peanut crop, a heavier application is necessary on cotton. In 1943 much rust or potash deficiency was apparent in the cotton crop, which could have been overcome by sidedressing with potash. A total of 60 to 80 pounds K_2O may be necessary on many light Coastal Plain soils to prevent rust and give satisfactory yields.

¶ Growers of cigar-leaf tobacco will find interesting information in Bulletin 440 of the Pennsylvania Agricultural Experiment Station, "The Yield and Composition of Cigar-leaf Tobacco as Influenced by Fertilizer and Preceding Crop," by D. E. Haley, O. E. Street, M. A. Farrell, and J. J. Reid. Most of the publication is devoted to results of a nine-year experiment involving the growing of tobacco in a three-year rotation of wheat, clover, and tobacco differently fertilized. On the tobacco, the standard rate of application was 1,000 lbs. of fertilizer, with the nitrogen varying from 0 to 9 per cent, the phosphoric acid from 0 to 8 per cent, and the potash from 4 to 16 per cent. Manure was applied on some of the plots and varying rates of 6-8-12 fertilizer were used more or less as the standard. Where the fertilizer was applied broadcast, there was less variation in yield with rate of application of 6-8-12 fertilizer than when applied in the row. Highest results from the broadcast application were obtained with 1,000 lbs. per acre, while the 1,500 lb. rate with the row method of application, gave the best results, and the highest yields in the experiment.

Varying the nitrogen from 0 to 9 per cent at the rate of 1,000 lbs. of fertilizer per acre resulted in highest yields with 6 per cent or 60 lbs. of nitrogen per acre. Studies of the nitrogen content of the leaf indicate that plowing under legume stubble results in a deficiency of nitrogen during the early stages of the tobacco growth which can be overcome by nitrogen fertilization. This lack of nitrogen from the legume stubble appears to be due to competition between the organisms decomposing the residue and the tobacco plants, with the organisms winning out. The nitrogen will be released later, but it may be made available to the tobacco crop at an unfavorably late part of the season.

When the phosphoric acid in the fertilizer was varied, best results were obtained with 8 per cent content of the fertilizer, or 80 lbs. phosphoric acid per acre. Chemical analysis of the leaves showed very little variation in the phosphoric acid content.

When the potash was varied, there was some increase in yield up to 12 per cent, but the differences were not great. The authors state that better results were obtained where manure was used with the higher potash applications. Analysis of the leaves indicated that potash applications had little influence on the potash content of the leaves under the conditions of this experiment. In the discussion it is brought out that the potash content of tobacco in Lancaster County is dependent more on the soil moisture than it is on the potash applied. In years of unfavorable moisture distribution where there is a drought followed by heavy rains, however, the tobacco which receives high potash applications is much better able to withstand disease attacks, which usually follow such weather conditions, than tobacco which did not have adequate potash available.

The preceding crop in this experiment was a legume, usually clover, but in some cases, alfalfa. Other work indicated that corn was much better as a preceding crop than a legume. Data from another experiment show that, regardless of fertilization, higher yields were obtained when tobacco followed corn than when it followed legumes. The nitrogen content and, in most cases, the potassium content of the tobacco were higher following corn than following legumes, and the burning quality of the leaf usually was better. During a season of ample moisture, fresh manure was favorable, while during dry seasons, it had a de-

cidedly unfavorable effect on the growth of tobacco.

It is brought out that cigar-leaf tobacco makes very heavy demands upon moisture and nutrient supply of the soil, so that heavy, fertile soils are needed for the crop. These soils should be kept in good tilth by the frequent supplying of organic matter in the form of manure or green manure, and the fertility must be kept at high level by the application of fertilizers. The rotation used in this experiment is not considered to be the most favorable for growing tobacco and, regardless of the fertilizer treatment, the desired levels of nitrogen and potash contents of the leaves could not be obtained. It is emphatically brought out that corn rather than legumes is the desirable crop to precede tobacco.

"Notes on Victory Garden for City People," Agr. Exp. Sta., Auburn, Ala., Dept. Mimeo. No. 15, Feb. 1943, L. M. Ware.

"Irrigation-Water Requirements of Citrus in the South Coastal Basin of California," Agr. Exp. Sta., Univ. of Calif., Berkeley, Calif., Bul. 686, March 1944, Arthur F. Pillsbury, O. C. Compton, and W. E. Picker.

"Annual Report of the Director, June 30, 1943," Agr. Exp. Sta., Univ. of Delaware, Newark, Delaware, Bul. 244, Dec. 1943.

"Produce Your Share," Ext. Serv., Univ. of Delaware, Newark, Delaware, W. E. Folder No. 8, Feb. 1944.

"Annual Report, June 30, 1943," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., 1943.

"Winter Wheat Varieties in Illinois," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., Cir. 563, Sept. 1943, George H. Dungan.

"Sweet Potatoes, How to Grow in Illinois," Ext. Serv., Univ. of Ill., Urbana, Ill., Cir. 580, May 1944, B. L. Weaver.

"Chemical Composition of Hemp Straw," Dept. of Agron., Univ. of Ill., Urbana, Ill., Ag. 1225, July 5, 1944, H. J. Snider.

"Alfalfa and Smooth Bromegrass for Pasture and Hay," Agr. Exp. Sta., Mich. State College, East Lansing, Mich., Cir. Bul. 189, April 1944, H. C. Rather and C. M. Harrison.

"Vegetable Varieties for Commercial Production in Michigan," Agr. Exp. Sta., Mich. State College, East Lansing, Mich., Cir. Bul. 191, March 1944, Keith C. Barrons.

"Eighty-Second Annual Report of the Secretary of the State Board of Agriculture," State of Mich., Lansing, Mich., 1943.

"The Extent of Hybrid Vigor in F_1 and F_2 Generations of Tomato Crosses," Agr. Exp. Sta., Univ. of Minn., St. Paul, Minn., T. Bul. 164, June 1944, Russell E. Larson and T. M. Currence.

"Growing Sweetpotatoes in the Yazoo-Mississippi Delta," Agr. Exp. Sta., Miss. State College, State College, Miss., S. Sheet 370, Dec. 1943, E. A. Currey.

"A Dairy Action Program for Missouri," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Cir. 283, Feb. 1944, A. C. Ragsdale.

"Timothy-Lespedeza Mixture," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Cir. 288, March 1944, C. A. Helm.

"Preparing Apples for Market and Their Sale," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Cir. 295, June 1944, A. E. Murneek and H. H. Baker.

"Compana and Glacier Barley," Agr. Exp. Sta., Mont. State College, Bozeman, Mont., Bul. 422, April 1944, S. C. Litzenberger.

"Varieties of Farm Crops for Montana 1944," Agr. Exp. Sta., Mont. State College, Bozeman, Mont., Cir. 177 (Rev. of C. 171), April 1944.

"Crop Standardization and the Production and Distribution of Pure Seed of Farm Crops in Montana," Agr. Exp. Sta., Mont. State College, Bozeman 2, Mont., Cir. 179, June 1944, S. C. Litzenberger, A. H. Post, and R. D. Mercer.

"Choosing Lands and Fertilizers for Potatoes," Agr. Exp. Sta., Mont. State College, Bozeman, Mont., War Cir. 8, April 1944, F. M. Harrington.

"Agricultural Research in New Hampshire," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Bul. 351, Nov. 1943.

"Small Grain and Corn Variety Tests," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Sta. Cir. 67, Feb. 1944, Ford S. Prince, Leroy J. Higgins, and Paul T. Blood.

"Dry-Farming Investigations in North-Eastern New Mexico, 1936-1943," Agr. Exp. Sta., N. M. College A. & M., State College, N. M., Bul. 312, March 1944, John Carter, Jr.

"Fifty-Sixth Annual Report, 1943," College of Agriculture, Cornell University, Ithaca, N. Y.

"Crop Calendars for a Year-Round Pasture Program," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Cir. C-116, July 1944, Hi W. Staten.

"Purpose of the Station and 1944 Planting Plan," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Mimeo. Cir. M-108, June 1944, Frank B. Cross and Charles Galeotti.

"1943 Cotton Variety Tests in Oklahoma," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Mimeo. Cir. M-109, March 1944.

"Forage Production of Small Grain and Rye Grass," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Mimeo. Cir. M-114, May 1944, Melvin D. Jones, Horace S. Smith, Ernest Muncrief, and Hi W. Staten.

"Palatability Test of Winter Pasture Crops," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Mimeo. Cir. M-115, May 1944, Hi W. Staten.

"Oklahoma Farm Wheat Improvement Program 1943-44," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Mimeo. Cir. M-116, May 1944, Roy M. Oswalt.

"A Pasture Calendar for Northeastern Oklahoma," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Mimeo. Cir. M-118, May 1944, Hi W. Staten.

"A Pasture Calendar for Central and Eastern Oklahoma," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Mimeo. Cir. M-119, May 1944, Hi W. Staten.

"Cowpea Varieties, Mung Bean Varieties," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Mimeo. Cir. M-120, May 1944, L. L. Ligon.

"Small Grain Results 1944," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Mimeo. Cir. M-122, May 1944, C. B. Cross.

"Utilizing Bluestem Grass in Maintaining the Commercial Cow Herd," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Mimeo. Cir. 124, April 1944, Bruce R. Taylor.

"Tree Fruits for the Home Orchard in Western Oregon," Agr. Exp. Sta., Ore. State College, Corvallis, Ore., Cir. of Inf. No. 328 (Rev. of Cir. of Inf. 308), March 1944, Henry Hartman.

"Lengthening the Garden Season and Increasing Vegetable Yields," Agr. Exp. Sta., State College, Brookings, S. Dak., Bul. 374, April 1944, Leon C. Snyder.

"The Chemical Composition of Forage Grasses from the Gulf Coast Prairie as Related to Soils and to Requirements for Range Cattle," Agr. Exp. Sta., A. & M. College, College Station, Texas, Bul. 644, Jan. 1944, J. F. Fudge and G. S. Fraps.

"Results in 1943 with Hybrid Corn and Corn Varieties in Texas," Agr. Exp. Sta., A. & M. College, College Station, Texas, Nov. 11, 1943, J. S. Rogers and C. H. McDowell.

"Hubam Clover in Rotations Causes Higher Yields and Less Root Rot," Agr. Exp. Sta., A. & M. College, College Station, Texas, Dec. 9, 1943, H. O. Hill, E. W. Lyle, and J. R. Johnston.

"Winter Legumes Reduce Root Rot and Increase Yield of Cotton," Agr. Exp. Sta., A. & M. College, College Station, Texas, Dec. 16, 1943, E. W. Lyle and H. O. Hill.

"Tomato Varieties in the Wichita Valley," Agr. Exp. Sta., A. & M. College, College Station, Texas, Feb. 1, 1944, B. S. Pickett.

"Gains Made by Cattle on Summer Range in Northern Utah," Agr. Exp. Sta., Agr. College, Logan, Utah, Bul. 314, June 1944, L. A. Stoddart.

"Fifty-Sixth Annual Report of the Vermont Agricultural Experiment Station, 1942-1943," Agr. Exp. Sta., Univ. of Vt., & State Agr. College, Burlington, Vt., Bul. 508, Oct. 1943, Harry R. Varney.

"The Conservation of Alfalfa and Timothy Nutrients as Silages and as Hays, III," Agr. Exp. Sta., Univ. of Vt., & State Agr. College, Burlington, Vt., Bul. 509, Feb. 1944, O. M. Camburn, H. B. Ellenberger, C. H. Jones, and G. C. Crooks.

"Feed Problems," Agr. Ext. Div., V.P.I., Blacksburg, Va., July 6, 1944.

"Pear Growing and Handling in Washington," Agr. Exp. Sta., State College of Wash., Pullman, Wash., P. Bul. 174, Feb. 1944, E. L. Overholser, F. L. Overley, and D. F. Allmendinger.

"Washington State: A New Forcing Tomato," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Bul. 436, Feb. 1944, C. L. Vincent.

"Vegetable and Small Fruit Growing in Toxic Ex-Orchard Soils of Central Washington," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Bul. 437, March 1944, Chester L. Vincent.

"Hybrid Corn," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va., Cir. WS I (Rev.), March 1944.

"Bromegrass & Alfalfa for Hay Pasture or Silage," Agr. Ext. Serv., Univ. of Wis., Madison, Wis., Cir. 344, May 1944, H. L. Ahlgren and F. V. Burcalow.

"Making High-Grade Hay," War Food Adm., U. S. D. A., Washington, D. C., AWI-97, May 1944.

"Lettuce Varieties and Culture," U. S. D. A., Washington, D. C., F. B. 1953, May 1944, Ross C. Thompson.

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Versatile Corn

WHEN corn makes headlines because of wartime restrictions on its sale, most readers think of corn as food for humans and feed for livestock —particularly pigs—or as seed for planting. But direct consumption of corn in the form of meal, grits, corn flour, and corn breakfast foods in 1943 was only about 65 million bushels out of a total production of 3,464,000,000 bushels. Feed and seed uses accounted for 3 billion bushels. A large part of the remaining 400 million bushels was required for industrial uses, many of them wartime indispensables, says the War Food Administration.

Cornstarch is the basic product for all industrial uses of corn. Cornstarch, variously treated, is going to the battlefront in explosives, penicillin, sulfa drugs, vitamin products, surgical dressings, adhesives, in textile finishes for clothing and shoes. It is used in printing inks, paper, rubber, asbestos, struc-

tural insulation board, gypsum board, including the V-boxes for overseas shipments to servicemen; also in shipping containers of all kinds and in fibrous glass cloth.

A bushel of corn will produce 33 pounds of cornstarch. And 33 pounds of starch, treated chemically, will produce 37 pounds of corn sirup or 25 pounds of dextrin. Dextrin is used in making molds for castings, wood veneer glue, labels, stamps, and envelopes. Most corn sirup products are edible—confections, bakery goods, beer, ale, jams and jellies.

Cornstarch is used for the core binder in producing copper, magnesium, aluminum, or bronze castings and forgings; also for brass, steel, and iron. It is used as a fiber in converting bauxite to alumina; and in magnesium production. These and many other industrial war uses for about 5 per cent of the corn production account for the special attention that has been devoted to the current year's corn crop.

Well Fertilized Pasture Pays In South Carolina

C. K. HUGHES of Union, S. C., has worked out a complete year-round grazing system, in which he has skillfully combined the use of recommended grazing crops so as to take complete advantage of seasonal conditions and land. Mr. Hughes has a well-fertilized, well-sodded pasture which was built new from land covered by undesirable scrub timber and brush growth. This pasture, as all permanent pasture, is at its best in May and June and the first half of July. Just at a time when it is beginning to go back because of hot, late summer conditions, he turns his cattle on a plot of pearl millet which gives this pasture relief during July and August. When the plot of pearl millet is almost grazed out, he takes his cattle entirely off the permanent pasture and gives it a fall rest so as not to eat it into the ground. The cattle are then alternately grazed upon the plot of pearl millet in the morning and upon an adjacent plot of kudzu in the afternoon. This kudzu is 3 years old and has established a very heavy growth. It is on land not suited to cultivation.

As soon as the pearl millet and residue growth of crab grass are gone, he turns that plot and plants it in a heavy seeding of oats, barley, and crimson clover. His cows then graze almost solely upon kudzu which carries them until frost. Immediately after frost, he turns the herd into a small field of corn and velvet beans which adjoins the kudzu and pearl millet plots. This corn and velvet bean grazing carries the cattle well into December when the pearl millet plot which has been seeded to oats, barley, and crimson clover should be up to grazing.

When the velvet beans and corn have been grazed out, he turns that field and plants it to a heavy seeding of oats and barley, which will be his late spring grazing plot. During January, and especially in February, March, and April, he gets very heavy grazing from the old pearl millet plot, which has been planted to grains, and the late grain grazing which followed corn and velvet beans. Between these two plots, he is able to keep his cattle off his permanent pasture until it has been firmly established in the spring and ready for heavy grazing. This system will then start all over again.

"Through heavy applications of barn-

yard manure and the basic mineral applications of lime, phosphorus, and potash, this system can and will be built into a very heavy-yielding grazing system which will be able to withstand more and more drought and other adverse grazing conditions," explains C. G. Cushman, dairy specialist of the Clemson College Extension Service. "We have seen no better example of a successful and skillful effort to take complete advantage of a year-around grazing program than that practiced by Mr. Hughes." *—Jack Wooten, Columbia, South Carolina.*

Fertilizing Soybeans in North Carolina

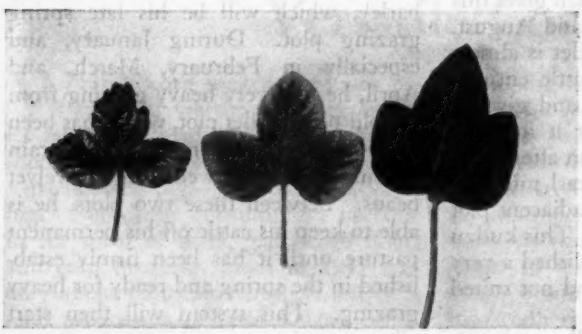
(*From page* 25)

clusion that a deficiency of potash constitutes a major problem in soybean production in this area.

Oil analyses in Tables 2 and 3 show that oil content was raised by potash applications. It was not affected by added lime or phosphate. It is not known whether this effect is a direct one, but it is interesting to note that the results are fairly consistent. The problem is being investigated further.

Soybeans are often grown in rotation with cotton and peanuts on upland soils low in organic matter. This practice has been followed experimentally at five locations. Phosphate added to peanuts ahead of soybeans was without effect on yield of soybeans which had themselves received a direct application of 24 lbs. P_2O_5 per acre. Similarily, nitrogen added to the peanuts ahead of soybeans was without effect on yield of the latter which had received a direct application of 4 lbs. nitrogen per acre. At the Upper Coastal Plain Branch Station in 1942, the application of 50 lbs. K_2O per acre to peanuts ahead of soybeans resulted in a 4-bushel-per-acre increase of soybeans which had received a direct application of 12 lbs. K_2O per acre. At the other four locations, potash added to the peanuts was without effect on the yield of beans.

The yields of cotton, which followed the soybeans, were in many cases increased by the potash added to peanuts two years previously. From this it would appear that the level of potash adequate for soybeans is below that which is adequate for cotton. In spite of this, however, the widespread occurrence of potash deficiency on soybeans on these soils indicates that a lack of potash constitutes one of the major limiting factors in soybean production of these upland soils.



Left, severe potash deficiency showing crinkling with yellowing and browning of marginal tissue, some of which is actually lost; center, less severe potash deficiency; right, healthy soybean leaf.

The available information leads to the conclusion that overcoming potash deficiency may be expected to bring about higher yields of soybeans in many fields. At the

same time, the existence of other troubles for which no remedy is known at the present time is recognized. Top-dressing applications of 50-100 lbs. muriate of potash prior to the first cultivation are recommended under all conditions. Depending upon previous fertilization, the application of 200 to 300 lbs. 0-10-10, or 0-12-12 (or 3-9-9 if after small grain), is recommended. A broadcast application of around 1,000 lbs. dolomitic limestone is recommended as a practical means of meeting the calcium and magnesium requirements.

Fertilizing for Yield and Soil Improvement

(*From page* 26)

turns govern the amount of fertilizer that can be used on any crop.

There is no means of avoiding some fixation. The Massachusetts Station obtained 285 bushels of potatoes with a ton of 5-0-7 fertilizer, 393 bushels with a ton of 5-8-7, and 432 bushels with a ton of 5-16-7. These data indicate not only a need for phosphorus in the fertilizer program, but that a large excess over the needs of the crop must be supplied for good production. A ton of 5-8-7 probably contained more than three times as much phosphorus as the crop used (assuming that none was contributed by the soil), and yet there was a yield increase of 39 bushels an acre when the phosphorus was doubled by using a ton of 5-16-7 fertilizer.

Making up deficiencies only seldom gives yield increases that are equivalent to the nutrient supplied in the fertilizer. At Massachusetts one ton of 5-8-0 produced 231 bushels of potatoes an acre. Probably a little more than half a pound of potash goes into the plant's nutrition for each bushel of potatoes produced. On this trial, a ton of 5-8-3 supplying 60 pounds of potash added 125 bushels to the yield, or a little more than a bushel for a half pound of potash. Larger additions of potash, however, had a lesser effect. One ton of 5-8-7 supplying 80 pounds more potash added only 37 bushels to the yield. A ton of 5-8-10 furnishing 60 pounds more potash than the previous treatment added only 25 bushels to the previous yield. Thus the yield increase dropped from two bushels to less than half a bushel of potatoes for each pound of potash as the fertilizer rate was increased, an example of the functioning of the law of diminishing returns. Presumably only a part of the potash added was utilized by the crop; a part of the excess no doubt remained in the soil to contribute to its improvement.

In contrast to phosphorus and potassium which are fixed by the soil, nitrogen cannot be long held except in combination with humus or plant materials. Most of the nitrogen applied as fertilizer is either used by the crop or soon leached and lost. Nitrogen can, however, be used in a soil-building program to grow humus materials, cover crops, and vigorous root systems which renew the soil humus.

To use nitrogen alone to grow crops that are harvested and sold may deplete the soil. Nitrogen is the growth element. The 100-bushel corn crop used nitrogen equivalent to that in 1,100 pounds of nitrate of soda. Liberal nitrogen fertilization enables the crop to remove the maximum of minerals, phosphorus and potassium, and other essential nutrients from the soil, and fertility exhaustion may be hastened as a result.

Good soils are relatively rich in available minerals. Soils of the desert, when watered, are sometimes phenomenally productive. Desert soils are unleached and are therefore rich in

readily soluble minerals. Phosphatic limestone soils are usually fertile. These soils are especially rich in calcium and phosphorus, two elements that are commonly somewhat deficient in the soil and more so in the strongly leached acid soils. To bring about soil improvement, not only the nitrogen and humus must be renewed, but the mineral supply must be increased. Since it is probably impossible to correct a nutrient deficiency without at the same time leaving a residue of nutrients in the soil, fertilizing for big yields and fertilizing for soil improvement are two parts of one operation.

High-acre Returns

Fertilizing for both big yields and for soil improvement is most economically done on crops producing high-acre returns. In contrast to corn and wheat, which seldom gross more than $50 per acre, some crops may return several hundred dollars per acre. Thus hops in western Oregon, yielding a ton at 75 cents, return $1,500 per acre. A ton of fertilizer per acre on hops would be a smaller relative expense than perhaps 100 pounds of fertilizer on corn or wheat. However, the demand for nutrient may be just as great for the crop yielding a smaller return.

In western Oregon the most common nutrient deficiency is nitrogen. The soils are heavily leached by winter rains which remove the soluble nitrate and other nutrients. As warm summer weather with little or no rainfall comes, the surface soil dries and nitrification in the topsoil which contains most of the humus is stopped. Likewise the functioning of roots in the dry topsoil is stopped either by the dry condition of the soil or by deep cultivation, which destroys the roots. The crop is thereby left with only a limited supply of available nitrogen throughout most of the good growing weather.

In practice this difficulty may be partially overcome by early fertilization (February or March when possible) with nitrogen fertilizer. Next to nitrogen in importance as a deficiency are possibly phosphorus or sulfur, and frequently boron. Practically all soils and most crops respond to a nitrogen fertilizer. The response to the other nutrient elements may not be noticeable until the nitrogen deficiency has been corrected.

Garden and small fruit crops usually receive a complete fertilizer, which should supply sulfur in addition to the N-P-K as assurance against a possible shortage of sulfur. Boron in the form of borax at 30 pounds more or less an acre, according to the crop, is necessary for the production of some vegetables and other crops. Rates of use of fertilizer increase as growers gain experience and confidence in their use. The beginner not infrequently reports no returns or sometimes damage from the use of fertilizer because he fails to realize the importance of proper placement, or because too little has been used to produce an appreciable increase in yield.

For completely satisfactory use of fertilizer in western Oregon, summer irrigation is necessary. Irrigation like the use of fertilizer is extended to more acres as the users gain experience. Water and fertility are a team; a serious shortage of either may render the other of little avail, particularly for those crops grown in midsummer season when the weather is hot and transpiration is high. The very early crops grown while the soil is moist from winter rains may respond satisfactorily to fertilizer without supplemental irrigation.

Another stimulus to the use of fertilizer in western Oregon is the ever-increasing indication of fertility depletion. Where wheat, hops, grass, or some other crop has been removed from the land for half a century or more with little return of fertility, production is likely to show a decline. Then the owners become interested in crop rotations, liming for legumes, and the use of fertilizers for bigger yields and soil improvement.

Fertilizer Expenditures in Relation to Farm Income

(*From page* 16)

above equation from the facts known at the beginning of the respective years. In other words, the greater differences between the actual and calculated expenditures in these years were probably due to the inability of farmers to accurately forecast their incomes in periods of sudden change.

The preliminary estimate of 1943 income from marketings of crops is $7,903,478,000 and from government payments is $672,000,000, making a total of $8,575,558,000 ($X_2$). At the time of writing, indications were that the similar total for 1944 would be about $8,850,000,000 ($X_3$). Of the total cash income in 1943, 46 per cent remained after all expenses of production had been deducted (X_4). When these values are substituted in the equation given at the beginning of this chapter, it appears that farmers would spend in the calendar year 1944 about $438,718,595 for fertilizers, or about 6 per cent more than was spent in 1943 for the same materials. As may be seen from a comparison of Figures 1 and 2, this is a smaller figure than would be forecast by previous methods.

Summary

It was found that the income from marketings of crops plus government payments is a little more highly correlated with expenditures for fertilizer than any of the other measures of income previously studied. It was found also that 93 per cent of all the fluctuations in expenditures for fertilizers in the United States between 1911 and 1943, inclusive, which varied from a minimum of $111,000,000 in 1932 to

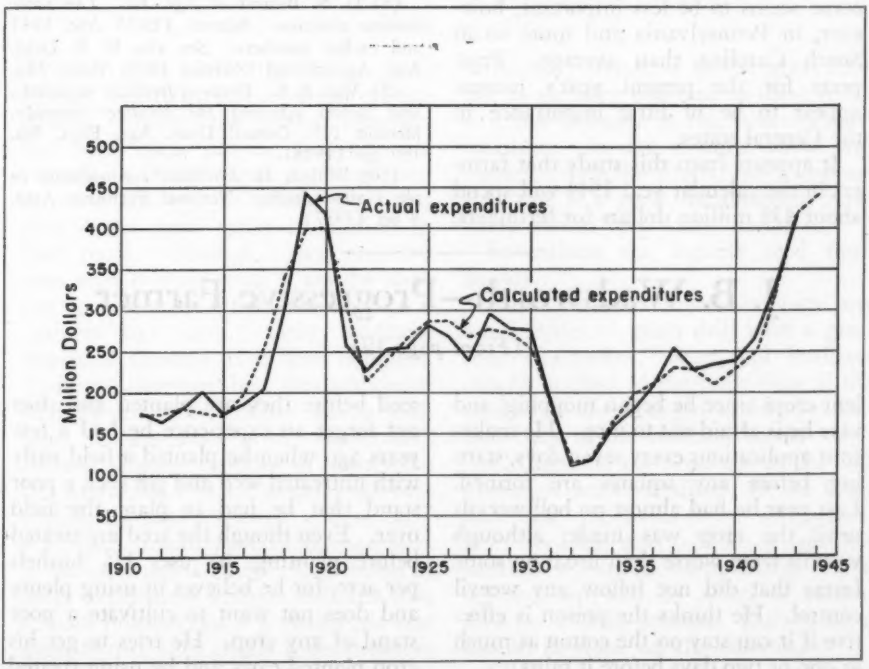


Fig. 2. Expenditures for fertilizer calculated by means of the equation $X_1 = .03293X_2 + .01766X_3 + 1.159X_4 - 18.8435$, as compared with the actual expenditures.

a maximum of $442,000,000 in 1919, are accompanied by corresponding fluctuations in three factors. These factors are: (1) cash income from marketings of crops plus government payments in the year before, (2) like income in the same year in which the fertilizer is bought, and (3) the proportion of the previous year's income remaining when all expenses of production have been deducted.

Fifty-six per cent of the deviations in expenditures for fertilizers from the average are accounted for by similar fluctuations in farm income from crops plus government payments in the previous year, 28 per cent by similar fluctuations in the same year's income, and 9 per cent by changes in the proportion of the previous year's income remaining after expenses of production are deducted. This leaves 7 per cent of the variations from the mean unexplained as probably due to other factors.

Similar indications were obtained for seven states. The previous year's income seems to be less important, however, in Pennsylvania and more so in South Carolina than average. Prospects for the present year's income appear to be of little importance in the Central states.

It appears from this study that farmers in the calendar year 1944 will spend about 439 million dollars for fertilizers, or about 6 per cent more than the 413 million spent in 1943.

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J. B. Wadsworth—Progressive Farmer

(*From page* 19)

lent crops since he began mopping, and says he is afraid not to mop. He makes four applications every seven days, starting before any squares are formed. Last year he had almost no boll-weevils until the crop was made, although weevils were worse than usual on some farms that did not follow any weevil control. He thinks the poison is effective if it can stay on the cotton as much as one or two days before it rains.

He has found that it pays to treat the seed before they are planted and does not forget an experience he had a few years ago when he planted a field early with untreated seed and got such a poor stand that he had to plant the field over. Even though the seed are treated before planting, he uses 1½ bushels per acre, for he believes in using plenty and does not want to cultivate a poor stand of any crop. He tries to get his crop planted early and by using treated seed, he, like other farmers, has found

that the young plants from treated seed can stand more adverse weather in the early spring than can cotton that carries a higher per cent of diseased plants from untreated seed.

In preparing the land, he first cuts it well with the tractor disk harrow. After the fertilizer is applied, a cotton plow is run behind the sower to mix it with the soil.

He has more stalks on the land than most farmers. The usual width of cotton rows in this locality is 3½ feet, but he makes his 3 feet and leaves 2 to 3 stalks per hill, 8 inches apart. In order to get a real crop of cotton, he says you must have the plants to produce it. He cultivates the cotton shallow every week after it comes up until growth prevents further cultivation.

The yields of his other crops are also well above average. He averages 19 to 20 bags of peanuts per acre, weighing from 95 to 100 pounds per bag, and 40 bushels or more of corn per acre, in addition to having a good growth of soybeans in the corn to go back to the land for soil improvement. On one field last year he produced more than 75 bushels of corn per acre and expects to beat that record this year.

Since he uses mules weighing from 1,200 to 1,400 pounds, he cultivates his corn and peanuts, also cotton while it is small, largely with riding cultivators. He likes his riding cultivators and would rather have them than anything with which he has ever worked a crop. Many farmers still hold to the one-mule cultivation of the crop with a five-hoe cultivator or cotton plow which requires three trips to the row, where the riding cultivator cultivates the entire row at one trip.

A Trash Mulch Method of Reclaiming Land With Alfalfa

(*From page* 9)

alfalfa in these trials. Including a grass in such seedings results in better erosion control, reduces weed growth, increases the yield, helps prevent heaving, and provides a cleaner crop by supporting it above the soil. Orchard grass has proved the most easily established in these trials. Although a good grass for poor soils, orchard grass is not the ideal one to sow with alfalfa for hay, as it matures too early. Only mediocre stands of timothy have been obtained. Tests at Columbus show that additional timothy can be drilled into alfalfa seedings in September with considerable success. Since timothy is somewhat late maturing, it is apt to delay the first cutting of hay, although a new early maturing timothy, Marietta, promises to be more satisfactory. Experience at other experiment stations indicates that smooth brome grass is probably the best grass to mix with alfalfa if the meadow is to be held for more than two years and used for grazing purposes. Since satisfactory stands of brome grass have not as yet been obtained in these trials, it is not included in the recommended mixtures. In one seeding, alsike was included with the alfalfa, and it appears that this is a good combination, especially where "seep spots" occur.

Inoculate the legume seed thoroughly.

Sow the seed broadcast with any hand seeder or grain drill with a grass seed attachment. Seed and fertilizer can be applied at the same time if the seed tubes are arranged so that the seed falls back of the fertilizer tubes.

Cultipack the seedbed as the last operation before seeding. In the trials described, the areas were cultipacked after seeding, only. Since a compact seedbed is desired, cultipacking before seeding, as well as after, is recommended if time permits. Cultipacking should be done on the contour.

Clip the new meadow seeding to control weed growth. The field may

look weedy and unpromising the first season. Clip off the weeds once or twice during the first summer whenever they reach a height of 8 to 10 inches; otherwise growth may become so rank that the alfalfa is choked out. This clipping should be done before mid-September if good fall growth for winter protection is desired.

In a very favorable season, considerable forage growth may be made the first season. It is better to leave this on the field. However, if any hay is made, it should be cut before September 15.

From these trials, it seems that alfalfa holds promise as a crop to utilize profitably, and at the same time rejuvenate, eroded Muskingum and related soils. Alfalfa has several characteristics which make it an exceptionally valuable soil-reclaiming crop for eroded hillsides if generous amounts of lime and fertilizer are used. Its root system goes deep for nutrients and moisture and adds many pounds of highly nitrogenous organic matter. The water-absorbing capacity of the soil is improved by this organic matter and by the openings left by decaying roots. Once established, alfalfa, unlike red clover, lives for several years, thus eliminating the necessity for frequent tillage of the soil.

Although starting alfalfa sounds expensive, it really is not. Lime is a necessity in most of eastern Ohio whether alfalfa is grown or not. The cost of the failure to use enough lime in eastern Ohio greatly exceeds the cost of the lime required to correct the situation. The fertilizer required is only a little more than should be used for wheat, a crop which returns very poor yields on such soils. The seed expense is not out of line when the long life of an alfalfa-grass meadow is considered. In favorable seasons, some hay or pasture can be had the year the seeding is made. Forage returns the year following sowing should more than cover the cost of establishing the crop. It is well to remember that a ton of good, early-cut alfalfa hay contains as much protein as a ton of bran. Areas sown in the manner described can be harvested for hay or grazed off. They should fill a real need for high-quality forage during midsummer, when permanent bluegrass pastures are apt to be short.

The "trash mulch" method of direct establishment of alfalfa-grass meadows on the "worn-out", badly eroded hill lands of eastern and southeastern Ohio possesses much promise as a means of restoring the productiveness of such lands. Farmers are urged to try the method, in a small way at first, to see how it works under their particular conditions. If there is sufficient vegetation on the ground to be converted into an effective "trash mulch", hillsides too steep for row crop cultivation can be converted immediately into high-quality forage-producing areas without creating an erosion problem.

Producing A Record Potato Yield

(*From page* 22)

provinces of Canada, a wide variety of high-quality produce is grown annually. The climate and soil conditions of the various sections of the Province vary considerably, thus allowing for the production of a variety of crops. Approximately 15,000 acres are planted each year to potatoes. During recent years there has been a considerable demand for B. C. grown certified seed potatoes in the States to the south. More than 80 carloads were shipped across the line last year. It is realized that such markets can only be maintained by exercising the greatest care in the growing and handling of the crops. Every effort is being made by both Federal and Provincial officials to see that only the best seed is produced for this export trade.

Bovine Bazaars

(*From page* 5)

cigar-biting judge handed out. But just try and tell the owner that and expect him to insert another bull sale ad with you.

I used to feel sorry for the breed clerks standing out there all day with their long ledgers with the flock of colored ribbons floating from the edges. We kept them in hot water wanting to see this or that name and checking on some animal not in the catalog. Next to the reporters, those guys had more coming to them than they ever got from the fair, which was mostly railroad money and expenses from their jobs as county agents.

I never yet felt sorry for any judge, even in the huge Holstein calf classes. Anybody with guts enough to stick out his neck to earn one hundred smackers a day won't get any sympathy from me. On the other hand it always made me boil when confirmed squawkers among the exhibitors started a whispering campaign about some judge who didn't give them the hog's share of the silk streamers. Their kine never thereafter got any of my expensive superlatives.

Speaking of exhibitors, I bet you I can tell what kind of cattle are being judged in a big expo by just looking at the ringside assembly. Your Holstein fans will be made up of dirt farmers mostly, only a mere five per cent of the crowd looking like munitions manufacturers or chain-store chiefs. Your Guernsey gallery will be mostly plow-pushers and teat-yankers, but with a mite more of the royal flush and the full house, probably fifteen per cent the velvet class.

But when you gaze over a Jersey audience you'll see special benches brought in for the day, maybe with cushions on them, on which are seated dowagers with sparklers talking to financial-looking gents who carry those sit-down canes, mute testimony to the fact that the Jersey is ace high in the Hudson valley and supreme in the Cotton Kingdom.

Over in the rampageous beef section there is no such manner of selection. Here you either have the dirt-farmer feeder and Midwest hay-tosser, or else the great, breezy, undefined brotherhood wearing wide sombreros, the ones who can't be identified until you hear them talk awhile.

IT'S a long cry indeed from these observations made in recent rings to the times when farmers sent their muley cows to the county fairs.

If you had a cow that wasn't a hooker and gave a fairly full pail of bubbly milk when she was fresh, and if she was a family pet and nobody wanted to sell her at any price, then you got the urge to tote her to Bingville for the annual livestock bazaar.

Pedigrees didn't count any more with cows than they did with the customers who paid egg money to get through the gates. A man was a man and a cow was a cow, and so what? You either liked or disliked them, and no score card was needed to list the pros and cons of it either.

They received the entries led in at the tails of country wagons, and tied them up in rows along the fence where rude shelters had been built twenty years ago and never patched up since. There wasn't any band music to liven up the cow barns and when they judged the critters on Thursday, which was Bingville Day, the oldest farmer in Whiffletree county merely walked along the line back of the bovines and squinted at them judiciously, taking a fresh chaw of Climax when he came to a right juicy-looking heifer. I've known him to hike back and switch a ribbon after he decided he'd made a mistake due to poor eyesight. Nobody yawped and abused him either and anyone who garnered a fifth prize had it framed

for the what-not and bought a life membership in the fair association in gratitude.

There were a few bulls on the country circuits in those days. Folks didn't talk much about male bovines then and only about one farm in five kept them, which made lots of extra leg work for Pa when Sukie's calendar was right. So the bull classes were meager and tame indeed in my day of barefoot fence-hopping at fairs. But if they could scrape up three or four male specimens on the last day, Uncle Zeke would have them led out a ways from the fence and slap on the grand championship over all breeds, families, and tribes. No registry clubs bothered us then and a bull was just useful for mating purposes to keep the milk jug flowing free.

HOLDING consignment sales and taking pictures of the prize-taking stock were unheard of, of course. In later days we have seen too many shows that were mostly curtain raisers for subsequent sales, and I am sure that some good films of my own, and maybe Brother Guard's too, have been wasted on so-called champions posed for penny-catching purposes.

Humanity is always looking for beauty of form and perfection of ideals. The trouble in the cow show trade, as well as in many other lines of human endeavor, lies in the imperfection of our own faculties.

Nobody is able to see through the skin and hide and hair of a cow or a bull to determine what's really underneath. Our cow shows run too much to type and form and score-card regulations. Our judges get into grooves of habit and custom and read too much past show history, often timid about giving the gate to some behemoth that deserves it, except that he has had a blazing record himself on the tan bark, or else his sire or dam was called magnificent somewhere else.

Too little scientific work has been done to check up on the performance of beef bulls as begetters of economic sirloins or about the relation of butterfat yield to level toplines or nice shoulders. Maybe the time is coming when we are going to modify our showring standards and get down to a real germ plasm system in finding successful combinations in breeding. Thus far in my own sideline observations I have seen too little stress put on proven production, even when some champion possessed it.

Yet we must credit the fanfare of the big circuit with adding a degree of glamor and attractiveness to the old job of being a herdsman. From a seedy individual with humble ambitions, the successive years of big cow shows have transformed the herd boss into a much sought man with larger horizons and, we hope, greater chance for genuine service.

I presume the fairs have done as much as that for some of the herds also, but we can get into quite a long argument over that proposition, and space forbids. Some of my neighbors who once followed the circuit now refuse to join up again, because of sundry serious maladies their cattle acquired in mingled rings. They decline to say whether any great advancement has come to their milk tonnage as a result of learning and buying in the wake of many shows.

I still wish I might find out more about the progeny of many of those champion animals I wrote about and took pictures of in past expositions. To me that would spell the final answer to the perplexity I have got into over the lack of permanent values in cattle showing.

Nevertheless each fall season whets my appetite for the friendly intercourse of modern cattle fairs, knowing as I do that they are imperfect and transitory. Life itself is, too, so maybe this fuss is foolishness. Maybe I am still justified in elbowing a millionaire aside to get a better look at a farmer's candidate for the sweepstakes, even if the critter doesn't wear a peerage pedigree.

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The following literature on the use of fertilizers in profitable soil and crop management is available for distribution. We shall be glad to send these upon request and in reasonable amounts as long as our supply lasts.

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Sweet Potatoes (General)
Fertilize Potatoes for Quality and Profits (Pacific Coast)
Fertilizing Small Fruits (Pacific Coast)
Better Corn (Midwest) and (Northeast)
Fertilize Pastures for Better Livestock (Pacific Coast)
Of Course I'm Interested (Pastures, Canada)
Meet the Family (Canada)

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HE'LL LEARN

"How come you didn't turn out?" demanded the sergeant. "Didn't you hear the bugle blow reveille?"

"Honest, sergeant, I'm afraid I'm going to be a flop as a soldier. I don't know one dern tune from another!"

At a meeting of a local council there had been some discussion regarding the type of milk which should be provided for the school children.

To conclude the debate, the chairman rose portentously to his feet.

"Gentlemen," he declared, "What this town needs is a supply of clean, fresh milk, and the council should take the bull by the horns and demand it."

"Bill shouldn't have married Irene. In six months' time she's made him a pauper."

"Wow! Is it a boy or girl?"

EDUCATED

"What do you know about love?" sez one guy to another.

"Plenty," sez the other guy, "I drove a taxicab for three years!"

And then there was the employer with a small cigar factory, who made this pathetic plea to the local draft board:

"We earnestly request that deferment be granted to John F. Dough. He is the only man left in our plant and at the present time is carrying on with 18 inexperienced girls."

There's a false and a true democracy. The false says: "I am equal to you." The true says: "You are equal to me."

Jasper—My cousin has become so fat that he can't play golf any more.

Joan—How's that?

Jasper—Well, if he puts the ball where he can hit it, he can't see it. And if he puts the ball where he can see it, he can't hit it!

Interviewer: "Have you any experience in defense work?"

Young girl applicant: "Yes; I used to go with a sailor."

A young Brooklyn soldier was on maneuvers in Oregon. Having a few minutes to himself after evening chow, he strolled out into the woods and soon came back with a handful of rattlesnake rattles.

"Where in the world did you get them?" gasped his alarmed companion.

"Off'n a woim," replied the lad from Brooklyn.

"I like the shy, demure kind," said the sailor, "you know, the ones you have to whistle at twice."

The fellow who blows his horn the loudest is likely in the biggest fog.

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